Ventura County (Calif.). Planning Divison.

Noise element of the general plan. 1974.

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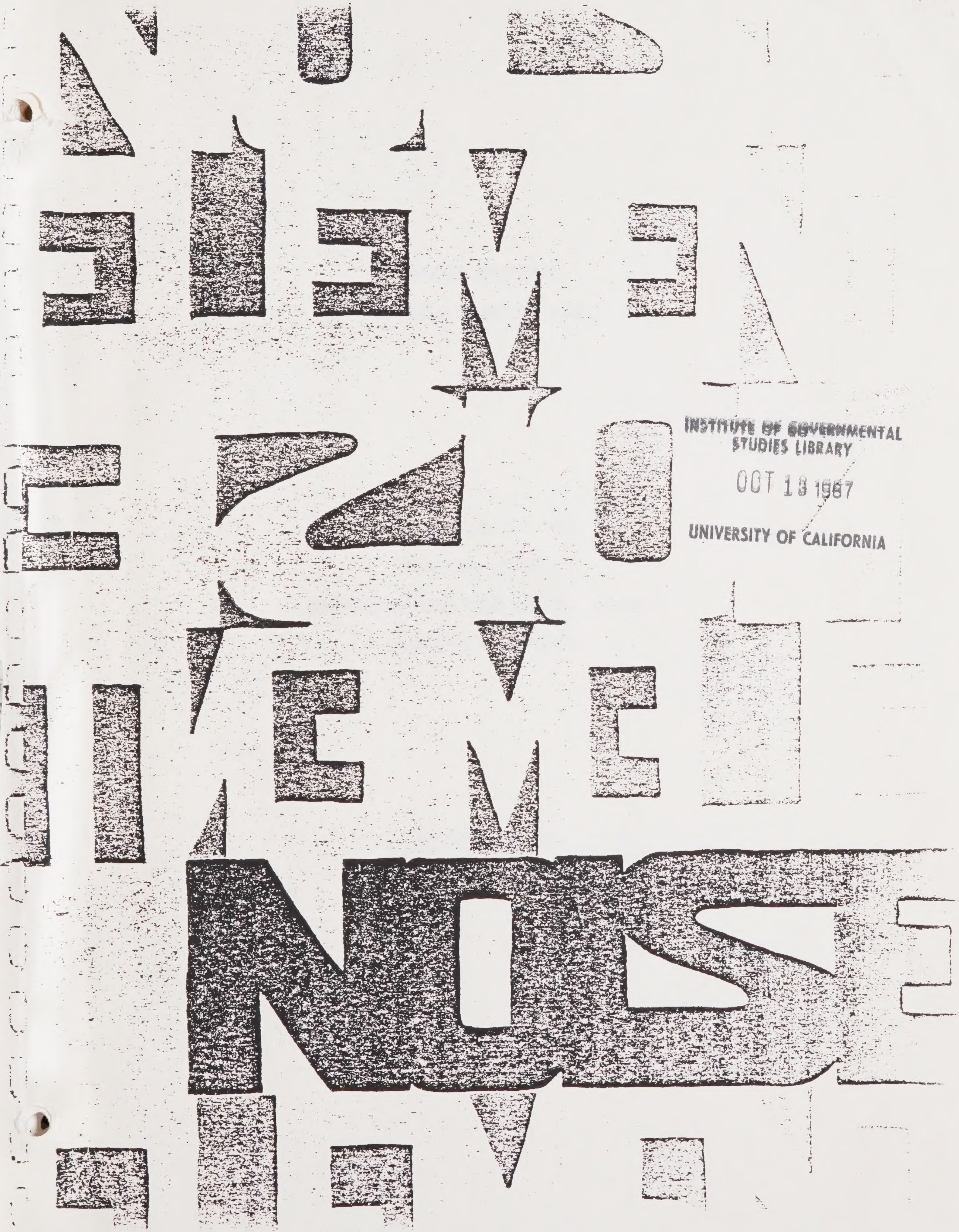

NOISE ELEMENT

OF THE GENERAL PLAN

PREPARED BY THE

VENTURA COUNTY

ENVIRONMENTAL RESOURCES AGENCY,

PLANNING DIVISION

OCTOBER 1974

ACKNOWLEDGMENTS

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TABLE OF CONTENTS

ILLUSTRATIONS AND MAPS

ILLUSTRATIONS Page

ILLUSTRATIONS Page

MAPS After Page

INTRODUCTION

NOISE

COMMENTS CONCERNING THE LAW

On June 30, 1972, Government Code Section 65302 was amended to require the inclusion of a noise element in the General Plan of each city and county. September 20, 1974, was established as the deadline for adoption of the element, however, provisions for a time extension were made. The law requiring the Noise Element reads as follows:

> *"A noise element in quantitative, numerical terms, showing contours of present and projected noise levels associated with all existing and proposed major transportation elements. These include but are not limited to the following:*
>
> *1) Highways and freeways*
> *2) Ground rapid transit systems*
> *3) Ground facilities associated with all airports operating under a permit from the State Department of Aeronautics*
>
> *These noise contours may be expressed in any standard acoustical scale which includes both the magnitude of noise and frequency of its occurrence. The recommended scale is sound level A, as measured with A-weighting network of a standard sound level meter, with corrections added for the time duration per event and the total number of events per 24-hour period.*
>
> *Noise contours shall be shown in minimum increments of five decibels and shall be continued down to 65 db(A). For regions involving hospitals, rest homes, long-term medical or mental care, or outdoor recreational areas, the contours shall be continued down to 45 db(A).*
>
> *Conclusions regarding appropriate site or route selection alternatives or noise impact upon compatible land uses shall be included in the general plan.*
>
> *The state, local, or private agency responsible for the construction or maintenance of such transportation facilities shall provide to the local agency producing the general plan, a statement of the present and projected noise levels of the facility, and any information that was used in the development of such levels."*
> *(Source: Government Code 65302(g))*

For a variety of reasons, the wording of the law has hindered the development of a meaningful Noise Element. First, the law focuses exclusively on transportation related noise and does not consider industrial or other point sources which also contribute to the overall problem. Second, since a standardized noise measurement or evaluation scheme was not mandated, all noise data received from mandated source, even where inconsistent, was included in the Element.

Third, the law requires contours down to 45dB (A) if the source impacts uses such as medical facilities or recreation areas. However, this contour level would, in many cases, be lower than the background noise of the area impacted. Furthermore, contours representing the 45dB(A) noise level are so distant from the noise sources that it is difficult to determine their exact location.

Fourth, except for hearing loss, definite conclusions have not been reached regarding noise levels which may cause adverse human and natural impacts. This, coupled with the problem of inadequate noise data, precludes the assessment of noise impacts upon compatible land uses (as required in the law), except in a most generalized fashion.

INTENT OF THE NOISE ELEMENT

The Noise Element:

(1) Introduces the tehnical aspects of noise,
(2) Provides a general overview of the present noise situation,
(3) Suggests strategies for reducing community noise,
(4) Provides a county-wide starting point for future programs, and
(5) Meets the requirements of State law.

ORGANIZATION OF THE ELEMENT

The Noise Element provides each jurisdiction with a perspective of their unique noise conditions, as well as an overview of the countywide situation. Local noise problems are delineated in Chapter VI, "Local Inventory,"

and countywide issues are contained in Chapter V, "General Inventory of Noise," although existing noise data is not sufficient for land use decisions but only as a guide for more detailed studies. Consequently, each contracting entity will receive a discussion or noise conditions within its jurisdiction, as well as an overview of regional noise conditions.

The Element is devised so that staff in each locality can use it to evaluate noise conditions within their jurisdiction. After a careful review of the "Findings" in Chapter VII, a local entity may decide on appropriate responses, possibly based upon the alternatives found in Chapter VIII ,"Options." Such responses range from taking no action to enacting new noise ordinances to control point sources. Each entity is offered a range of options which can be translated by local staffs into final recommendations and submitted to their commissions and councils. Thus, county staff will not be making recommendations but will offer, instead, a range of responses for each locality's consideration. The locality, aware of its unique situation, interests, and concerns, can then determine the appropriate response.

To assist the various staffs in the development of appropriate responses or recommendations, the Element includes Chapter IX entitled "Recommendations on Options." This chapter, comprised of the recommendations from various authorities and advisory groups, is intended to guide decision makers in the adoption of appropriate responses.

To summarize, the Element is designed to: Provide entities within the county a regional and local perspective of the issue; offer alternative solutions to the problems identified; and lend guidance in selecting the appropriate alternatives.

GENERAL DESCRIPTION

NOISE

THE URBAN NOISE PROBLEM

Noise is commonly defined as unwanted, annoying sound. It is a pollutant which lowers the quality of life and detracts from the enjoyment of urban living. At sufficient levels, noise can cause annoyance, speech interference, sleep disturbance, psychological distress, physiological stress and hearing loss. Such noise levels may already exist in some areas of Ventura County.

The most immediate noise problems occur in the buildings people occupy - their homes and places of work. Such noise sources will be addressed only briefly in this element because they are outside the purview of a planning study. Apart from indoor noise sources, motor vehicles, as a group, are the most pervasive contributors to urban noise. Aircraft, however, which are not the most pervasive noise generators, produce the most aggravated community annoyance reactions. Other significant noise sources include factories, railroads, powered gardening equipment, stereo sound amplifiers, musical instruments, power tools and air conditioners.

Most of the noise problems we encounter could be mitigated through the application of simple preventive measures, including:

1) reduction of noise at the source,
2) modification of the path of the noise with the aid of baffles and screens,
3) reduction of noise at the receiver with various types of insulation.

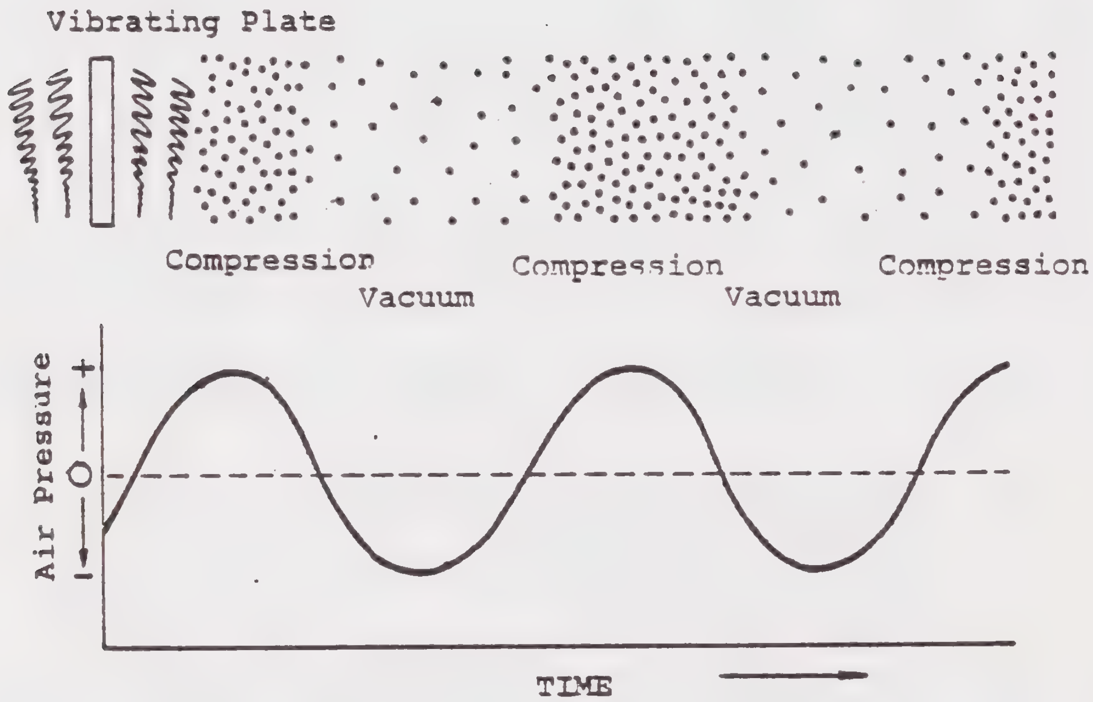
One very effective mean of controlling noise is to control the growth and distribution of population through wise land use planning practices. In this way, residential areas can be separated from freeways, airports and noisy businesses; and the mushrooming numbers of noise sources can be stemmed.

THE GENERATION & TRANSMISSION OF SOUND

The generation and transmission of sound is easy to understand; see illustration 2.1. Consider a plate suspended in air bounded on both sides by layers of air. If we strike the plate it vibrates, moving rapidly back and forth. As it moves, it compresses the air in the direction of its motion and when it reverses direction, it leaves a partial vacuum or rarefaction of the air. These alternate

Illustration 2.1

Generation and Transmission of Sound Waves



Source: ORANGE COUNTY HEALTH DEPARTMENT, 1973, Page 3.

compressions and rarefactions cause small fluctuations in atmospheric pressure which are repeated in subsequent layers of air radiating outward in all directions from the plate. When the pressure variations strike the ear drum, it vibrates in response to the changes in pressure. The disturbance is carried through the inner ear to the brain where it is interpreted as sound.

In the above example, air was the "medium" through which sound was transmitted. Sound, however, may also be transmitted through liquids such as the clanking of a diving board heard under water in a swimming pool. Solids also transmit sound as evidenced by built-in dishwashers in apartment buildings. This example points out that solids transmit vibrations that are felt as well as heard. In general, sound travels faster and with less excess attenuation in solids than in air.

CHARACTERISTICS OF SOUND

LOUDNESS

As discussed above, the sound we hear is the result of fluctuations in air pressure or sound pressure levels (S.P.L.). The loudness of a given sound is a function of its air pressure: the greater the pressure, the louder the sound. Referring to illustration 2.1, loudness corresponds to the height of the waves or the density of the dots, and is measured in microbars which is the equivalent of one one-millionth of an atmosphere. Loudness can also be measured in terms of sound power (PWL, power watt level).

PITCH

The pitch or frequency of a sound is determined by the number of air pressure fluctuations that occur in a second. In Illustration 2.1, pitch is illustrated by the number of wave crests or dot groupings that appear over a given distance (time) on the diagrams. Pitch or frequency is measured in cycles per second (cps) or Hertz (Hz).

ATTENUATION

The diminishing of sound levels or loudness as a sound travels away from its source. Sound level diminishes by

half with the doubling of its distance from the source. In other words, the intensity of a sound diminishes exponentially.

PERCEPTION OF SOUND

As stated earlier, we perceive sound because of fluctuations in air pressure which set up vibrations in our ear drums which in turn are interpreted as sound by our brain. These fluctuations are so small that they are not measured in atmospheres (14.7 pounds per square inch) but in microbars which are roughly a millionth of an atmosphere.

Even at these infinitesimal pressures, the human ear can detect pressure levels as small as .0002 microbars. People can also tolerate sound pressures of approximately 200 microbars before experiencing discomfort - a one million-fold increase over the minimum pressures capable of being perceived. The human ear is, therefore, very sensitive to a broad range of sound levels, while we can perceive frequencies from 20 to 20,000 cps. Despite this sensitivity, it takes a 5-decibel increase (or a near doubling) in sound intensity before we can perceive an increase in loudness and a 10-decibel increase to perceive a doubling of the sound level.

MEASUREMENT OF SOUND

Thus far, this chapter has discussed the generation and transmission of sound, the characteristics of sound and lastly our perception of sound. This section will discuss the measurement of sound and how sound measurements attempt to relate theoretical sound with our perceptions of sound.

One way of measuring sound is to measure its sound pressure in microbars. Another way is to measure sound power, or the watts per square meter produced by a given sound pressure. In both cases, the normal ranges to be measured are tremendous: .0002 to 2000 microbars of sound pressure, and .0000000001 to 100 watts/m^2 of sound power. It is evident that sound pressure and power are not equal units, but that power increases much faster than does sound pressure.

To conveniently express these great ranges, the decibel (db) was devised. Simply put, the decibel is a sound level unit of a logarithmic scale. The logarithmic scale compresses the huge ranges mentioned above to a much smaller

Illustration 2.2

Corresponding Sound Measurement

Sound Power Watts/m²	Sound Pressure Microbars	Sound Level dBA	NOISE SOURCE		
1×10^2	2×10^4	140			
1×10	2×10^3	130			
1	2×10^2	120	OXYGEN TORCH SNOWMOBILE		ROCK-n-ROLL BAND
1×10		110	RIVETER TEXTILE LOOM	JET TAKE OFF at 1000'	
1×10^{-2}	2×10^1	100	ELECTRIC FURNACE POWER MOWER	JET FLYOVER (1000') ROCK DRILL*	
1×10^{-3}		90		MOTORCYCLE* SNOWMOBILE* POWER MOWER*	PRINTING PRESS FOOD BLENDER
1×10^{-4}	2	80	LATHE	DIESEL TRUCK*	GARBAGE DISPOSAL
1×10^{-5}		70		PASSENGER CAR*	CLOTHES WASHER DISHWASHER VACUUM
1×10^{-6}	2×10^{-1}	60		AIR CONDITIONER*	CONVERSATION LARGE STORE
1×10^{-7}		50			
1×10^{-8}	2×10^{-2}	40			
1×10^{-9}		30			WHISPER
1×10^{-10}	2×10^{-3}	20		* at 50'	
1×10^{-11}		10			
1×10^{-12}	2×10^{-4}	0			

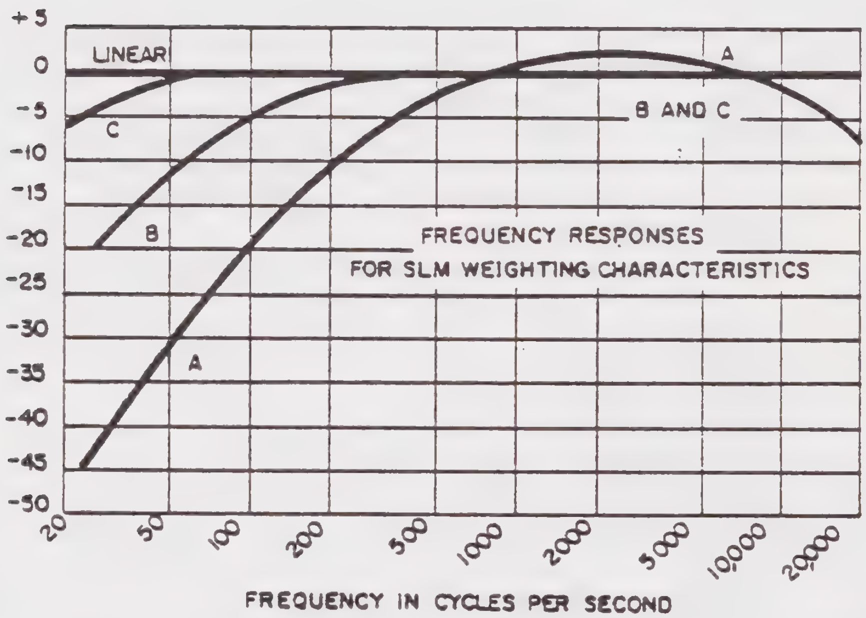
SOURCES: DEPARTMENT OF PUBLIC HEALTH, 1970, Page 22.
Adopted from TAYLOR, 1970, Page 56.

range. As portrayed on illustration 2.2, the decibel range of 0 to 140 corresponds directly to sound pressure and power thereby becoming the universal measure of both.

The decibel (db) represents a theoretical noise level measured on a noise meter which, because we have selective perception, may not accurately depict what we hear. To correct this situation, various weighting scales are applied to decibel readings so that they will more closely approximate what we actually hear. The three most common weighting scales are depicted on illustration 2.3.

Illustration 2.3

Frequency-Response Characteristics
For Sound Level Meters



Source: ORANGE COUNTY HEALTH DEPARTMENT, 1973, Page 7.

The "A" scale, which is the most commonly used scale in measuring community noise, effectively reduces the decibel levels of sounds with frequencies above and below our most sensitive range (1000 cps to 8,000 cps) and in so doing provides dbA readings which better approximate the level of sound we actually hear. Referring to illustration 2.3 for example, a 200 cps sound of 60 db would be lowered 10db to

50 dbA while a 2,000 cps sound of 60 db would be raised 3 db to 63 dbA. The dbA readings of 50 and 63 more accurately reflect our perception of the relative loudness of the two sound levels than do the initial 60 db readings.

To summarize, a sound of a given frequency can have a theoretical intensity expressed in sound pressure, sound power, or their corresponding decibel level. These measures relate to theoretical intensity and not necessarily to what we hear. We therefore bias noise level readings (in decibels) with various weighting scales, the most commonly used are being the "A" scale. Please refer to illustration 2.2 for corresponding sound power, sound pressure and "A" weighted sound levels for various noise sources.

FACTORS WHICH AFFECT NOISE TRANSMISSION & MEASUREMENT

It was pointed out earlier how our perception of sound effects the measurement of sound. This section will discuss some of the physical factors that effect the transmission of sound and thereby also effect its measurement.

The medium through which noise travels determines in large part its speed of travel and its degree of attenuation. Generally, noise travels faster and with less excess attenuation in solids than in other mediums such as air or water. Distance has a direct effect on attenuation. Assuming an unobstructed path, noise pressure and power levels dissipate an equivalent of six decibels for every doubling of distance.

Noise can be reflected by barriers such as buildings, walls, vegetation, and topography. The positioning of barriers may, however, create reverberations or a focusing of sound pressure waves which may effectively raise the sound level. When taking sound measurements, therefore, caution must be taken so that instruments are not set up in such areas and record exaggerated readings.

Noise may pass through barriers which do not have enough mass or which have minute openings. For example, acoustical tile reduces reverberation within a room, but it does not have enough mass to prevent noise from passing between rooms.

Weather also effects noise transmission and measurement. Relative humidity and temperature effect noise propagation and their levels should be noted on any noise measurements done. Rain drowns out noise and as a result, measurements should not be taken during rainy periods. Noise is masked

by wind and when traveling against it, the noise is attenuated. Therefore, measurements should not be made in winds above 5 mph without a windscreen and never above 20 mph.

WORKING WITH SOUND MEASUREMENTS

Because sound levels are commonly measured in decibels which are based on a logarithmic, not arithmetic, scale, caution must be exercised when working with sound level figures. For example, two 110 dbA sounds together do not produce a "total" sound of 220 dbA, but rather 113 dbA. This can be shown on Illustration 2.2 by examining the sum of power equivalent of 110 dbA. Its doubling from .1 watts/m^2 to .2 watts/m^2 raises the sound's decibel level from 110 dbA to 113 dbA, not 220 dbA. It would take a one hundred and ten-fold increase in sound power to raise the original sound level of 110 dbA to 220 dbA. Looking at the relationship between sound pressure and sound levels (dbA) on Illustration 2.2 reveals that a ten-fold increase in sound pressure results in 20 dbA increase in sound level and <u>not</u> a 10 dbA increase as was the case with sound power.

When dealing with sound attenuation, every doubling of the distance from the source results in a 6 db reduction in sound pressure. For example, moving from 10 feet to 20 feet from a source would reduce a 95 decibels sound level to 89 decibels.

The cardinal rule to remember when dealing with decibels is that they should never be simply added or divided: doubling sound levels or combining two different sound levels is not represented by the doubling of decibel levels (110 db + 110 db $\neq$ 220 db, 60 db + 63 db $\neq$ 123 db). Halving sound levels is not represented by a halving of the original decibel level (110 db divided by 2 $\neq$ 55 db).

TYPES OF SOUND

Sounds encountered in community noise may be differentiated on the basis of the range of the frequencies that make up the sound, the number of occurrences of the sound or its periodicity, and the onset of the sound (See glossary).

The range of the frequencies of a sound can vary from only one frequency (known as "pure tone") to a sound containing a wide range of frequencies, known as "broad band"

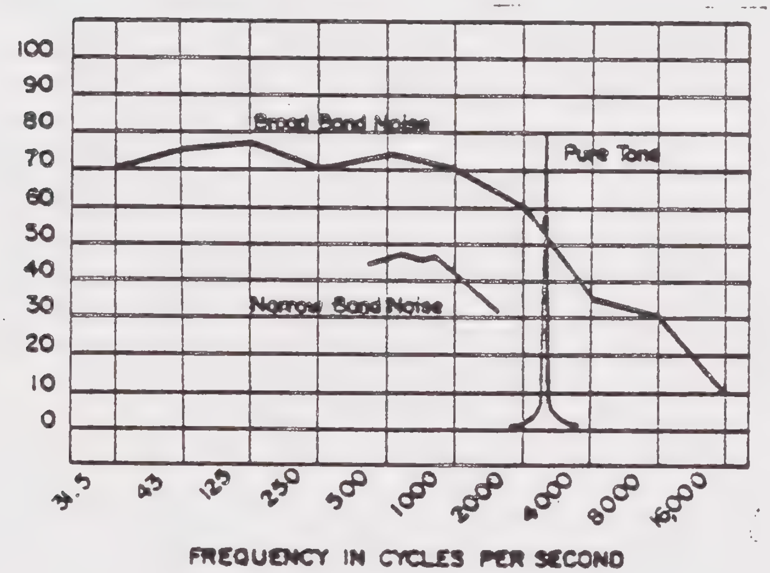
or "wide band." The periodicity of a sound may be continuous or steady state, repeated at a certain rate or "intermittent," or may occur only once. Finally, the "onset" or beginning of a sound may be gradual or sudden and sharp. Based on these categories, five types of community sounds may be defined: (Source: NATIONAL BUREAU OF STANDARDS (a), 1971, pg. 10).

1. Steady Wide Bank Sound - This is a continuous sound composed of a large range of frequencies. The onset may either be slow or sudden. Air moving through air condition ducts is an example of steady wide band sound.

2. Steady Narrow Band Sound - This sound is the same as steady wide band sound except that it is a continuous noise composed of a small range of frequencies, or a single frequency or "pure tone." A circular saw cutting through a piece of wood is an example of steady narrow sound. Illustration 2.4 portrays the difference between steady narrow and wide band sound.

Illustration 2.4

Three Types of Noise



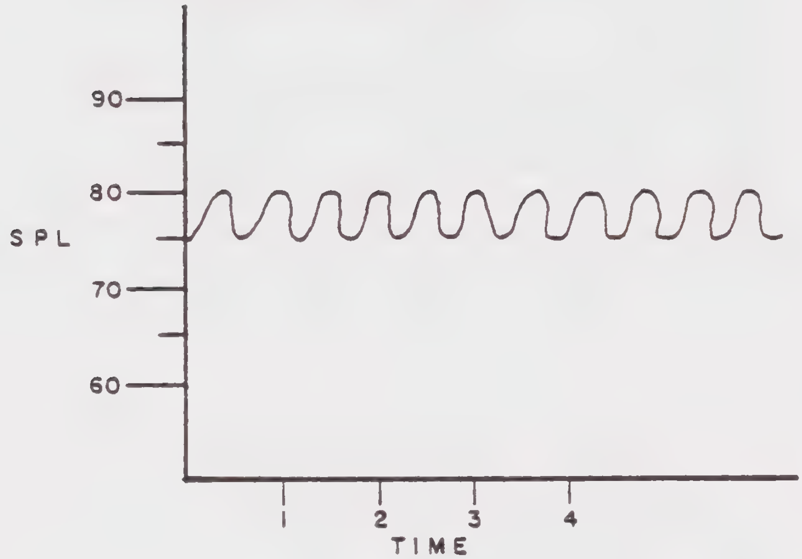
Source: Adapted from CITY OF INGLEWOOD, 1972, pg. 3

3. Intermittent Sound - Intermittent sounds may have wide or narrow frequency ranges or be of a "pure tone," but unlike the first two types of sounds, they occur several times during a given period. The sound may occur at random

or at a constant rate but not continuously. The onset of intermittent sound is gradual rather than sudden. The fly-overs of aircraft from a busy airport are examples of intermittent sound. Illustration 2.5 illustrates intermittent sound.

Illustration 2.5

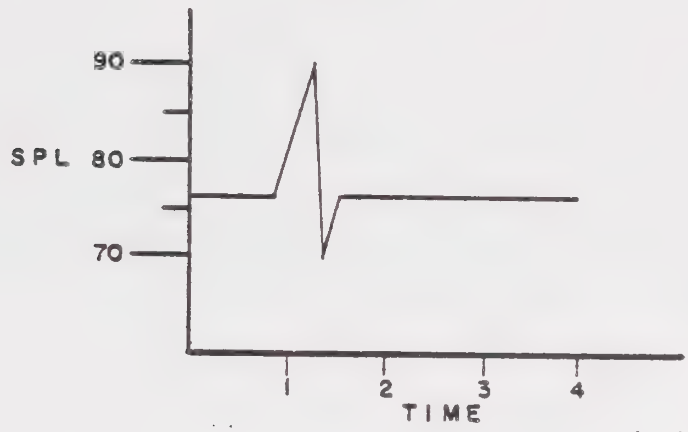
Intermittent Noise



4. Impulsive Sounds - These are differentiated from intermittent sounds by their sudden onset and very short duration. Generally, an impulsive sound is defined as lasting for one second or less and beginning with a sudden increase in sound pressure. A gunshot or a car backfiring is an example of this type of sound. Illustration 2.6 illustrates an impulsive sound.

Illustration 2.6

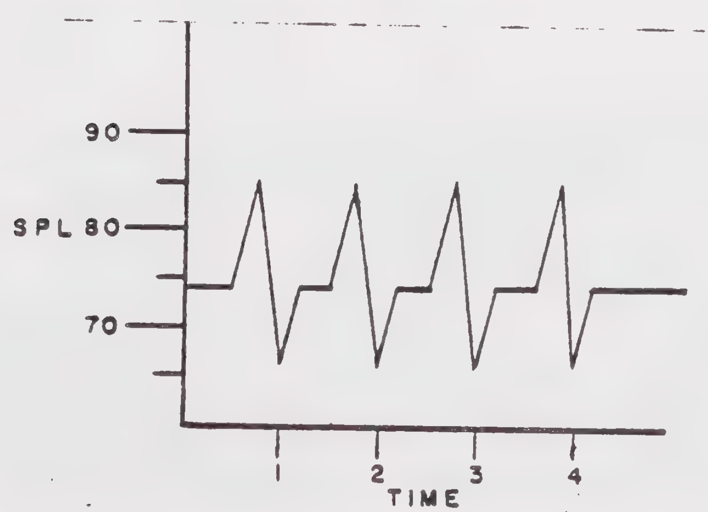
Impulsive Noise



5. Repeated Impulsive Sound - This is a sound which has the characteristics of both impulsive and intermittent sound. It has the onset characteristics of an impulsive sound (sudden rise in air pressure) and the repetitiveness of an intermittent sound. Riveting at construction sites is an example of a repeated impulsive sound. Illustration 2.7 graphically represents a repeated impulsive sound.

Illustration 2.7

Repeated Impulsive Noise



NOISE EVALUATION SCHEMES

NOISE

The first chapter attempted to provide a general introduction to noise by explaining some of its fundamental characteristics, how we perceive it, and the difficulties in measuring it in a meaningful way. This chapter will deal with the negative effects of noise.

WHO & WHAT AFFECTED

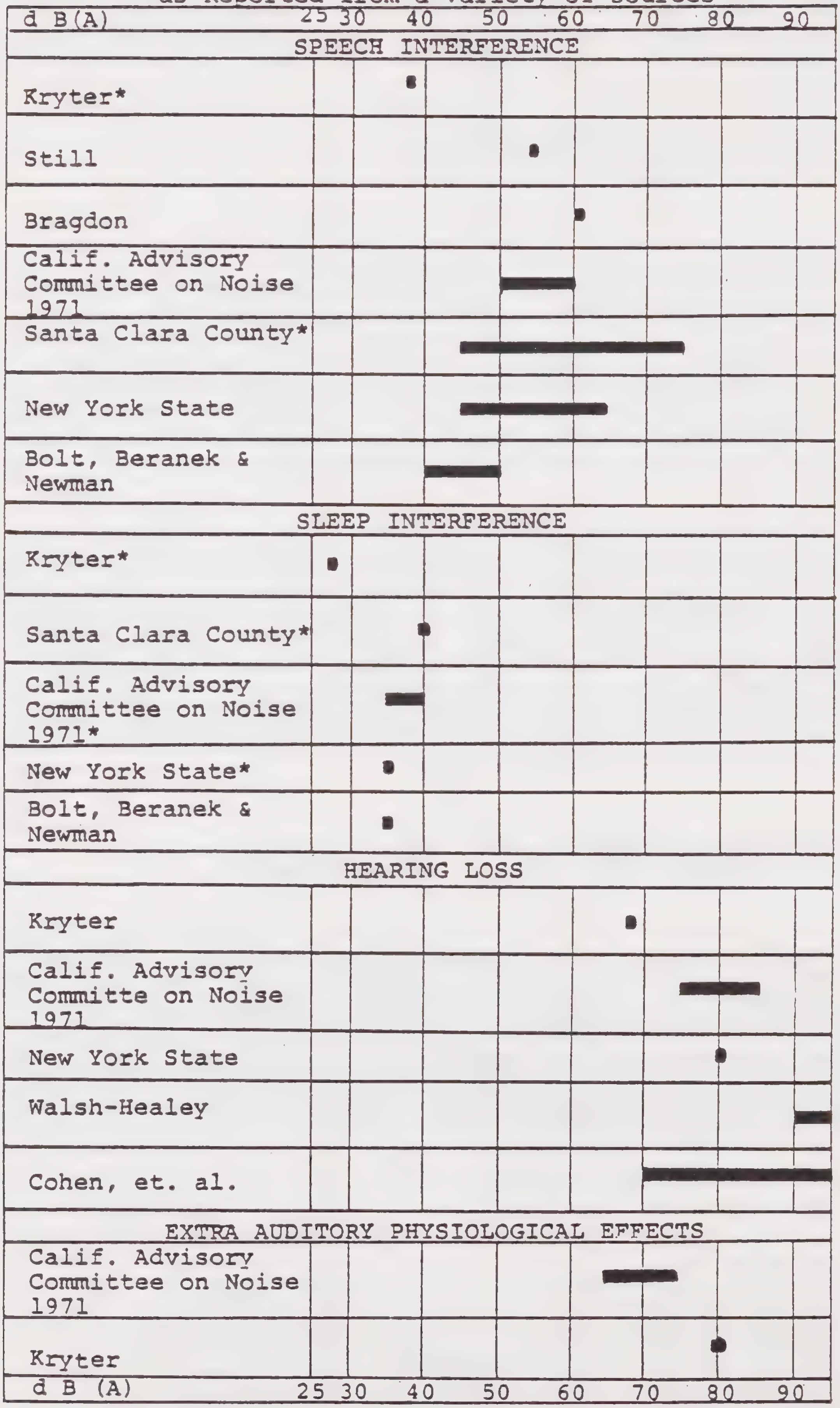
There is little doubt that people are adversely affected by noise, but in addition to people, animals and structures are also affected by noise. Wildlife is generally located far enough away from noisy urban areas to avoid major impacts. However, livestock and poultry ranches in rural areas may be affected by a particularly noisy source nearby. Such cases exist within the county. While structures can be affected by sound, they are more often affected by non-auditory vibrations. Sound levels themselves rarely reach levels which would cause structural damage.

There are a number of areas in which it is known that noise has an adverse effect. The degree to which noise is the cause and the levels at which it produces certain reactions is not as well known, and therefore, a good deal of noise research is concentrated in these areas. Illustration 3.1 summarizes preliminary research data which is so far quite limited and often inconclusive. Note the broad sound level ranges which cause the various reactions and the variance among researchers. Subsequent inventories in this chapter will specifically address the resources impacted by noise.

ANNOYANCE OR HARM TO HEALTH

Before going on to discuss the primary and secondary impacts of noise, it should be noted that people are effected by two broad categories of noise: annoying and harmful to health. The distinction between the two categories is not always clear, but generally speaking, annoying sounds must be heard and must irritate us. Noise which causes harmful effects may not necessarily annoy us, though extremely loud noises are likely to be both annoying and harmful.

Illustration 3.1
Noise Levels at which Various Effects Occur
as Reported from a Variety of Sources



*Recipient Noise Levels

It is generally accepted that people react differently to the same noise. In part, this can be explained by the inherent differences between individuals. This differential reaction, particularly to annoying noises, may also be explained by a number of factors listed below:

1) Individual sensitivity of person exposed.

2) Tonal quality of the noise.

3) Periodicity of the noise.

4) Loudness of the noise.

5) Previous community experience to noise exposure, if any.

6) Time of day when noise occurs.

7) Season of year when noise occurs.

8) Information content of the noise.

9) Background noise.

10) Type of onset of the noise.

11) Attitude toward the noise.

12) Variability of noise level.

13) Duration of noise.

14) Ability of the recipient to control the noise.

15) Anticipation of the noise.

16) Visibility of the noise source.

PRIMARY EFFECT OF NOISE

Illustration 3.1 summarizes research data on four general reactions to noise. The listing that follows outlines in greater detail the various responses to noise. The effects that occur are considered "primary" because they are a direct result of noise:

A. <u>AUDITORY</u> (Source: THE CENTRAL INSTITUTE FOR THE DEAF, 1971, Page 6-54).

1. Temporary and permanent hearing loss.

2. Masking and interference with speech and other informational sounds.

B. <u>PSYCHOLOGICAL AND SOCIOLOGICAL</u> (Source: THE CENTRAL INSTITUTE FOR THE DEAF, 1971, Page 58-123).

1. Sleep interference.

2. Annoyance.

3. Interference with attention.

4. Time judgment.

5. Acoustical privacy.

6. Mental disorders.

C. <u>PHYSIOLOGICAL</u> (Source: THE CENTRAL INSTITUTE FOR THE DEAF, 1971, Page 125-136).

1. Responses of voluntary and auditory-muscular reflexes such as "startle response".

2. Responses of smooth muscles, e.g. constriction of peripheral blood vessels, changes in respiratory and heart rate.

3. Neuro-endocrine system reflexes such as ulcer and stress reactions.

4. Other neurological responses such as nystagmess (involuntary rapid occillation of the eyeball) and vertigo.

D. <u>NATURAL RESOURCES</u> (Source: MEMPHIS STATE UNIVERSITY, 1971).

1. Farm Animals - problems with reproduction by chickens.

2. Wildlife -

   a) Observable reactions to noise by: rats, gray whales, rabbits, deer, starlings, fish, insects.

b) Breeding habits of California Condor may be affected by noise. (Source: SIBLEY, 1969, Page 8).

E. ECONOMIC (Source: NATIONAL BUREAU OF STANDARDS,1971, (c)). See Illustration 3.2.

1. Property values - studies were done in Los Angeles and San Francisco concerning airport noises and land values. The Los Angeles study found no statistically significant difference between rate of appreciation in homes with high noise levels and those in "quiet" areas, although turnover rate in quiet areas was 62% of the rate in noisy areas. The San Francisco study did find a statistically significant difference, but in both cases it was impossible to determine the full extent of loss, if any, due to intervening variables.

   A study by the City of Inglewood, found that residential land values were 50% higher in areas where aircraft noise was below 80 PNdb. (Source: HURLBURT, 1972, Page 2).

2. Rental Values - The Inglewood study found vacancy rates 50% lower in areas where aircraft noise was less than 80 PNdb. (Source: HULBERT, 1972, Page 2 Property Values).

   A Portland, Oregon study on the effects of freeway noise on rentals of apartments showed no significant impact on rents.

3. Damage Claims - Los Angeles International Airport has had a total of $2,814,531,725 in damage claims over the 1960's with some cases still pending. Over the nation, airport claims have been estimated at $4 billion.

F. STRUCTURES (Source: UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (a), 1973, Page 12-1).

"Airborne sound normally encountered in real life does not usually carry sufficient energy to cause damage to most structures. The major exceptions to this are sonic booms produced by supersonic aircraft, low frequency sound produced by rocket engines and some construction equipment, and sonic fatigue."

SECONDARY EFFECTS OF NOISE

The secondary effects of noise are the unforeseen consequences associated with its primary effects. While harder to enumerate and validate, their impact may be greater in the long run than the primary effects. The list that follows outlines possible and probable secondary effects of noise.

A. PHYSICAL AND PSYCHOLOGICAL IMPACTS

1. Sleep Interference - According to Doctors William P. Wilson and William Zung, lack of sleep may lead to irritability, mental disorganization, dreaming while awake, hallucinations, and automatic behavior; occasionally bordering on temporary insanity. It should be noted though that some of these reactions would only affect people who initially had mental problems. (Source: BERLAND, 1970, Page 68).

2. Dream Interference - Julius Buchwald, psychiatrist for the Downstate Division of New York State Medical Center mentions dream interruption might cause: Nightmarish memories, paranoidal delusions, hallucinations, suicidal and homicidal tendencies, reduced sense of humor and inability to handle everyday frustrations. (Source: BERLAND, 1970, Page 69).

3. Speech Interference - Noise can be a significant interfering factor in education and social intercourse.

4. Constriction of Blood Vessels - might cause secondary impacts on hearing loss, possible interference with pregnancy, etc.

B. ECONOMIC

1. Speech Interference - Speech interference may impact commercial sales and reduce work output in jobs where interpersonal communication is important.

2. Interference with Attention Span - This may also cause reduced work output in office spaces, particularly the open design concept which is used in many new buildings.

Illustration 3.2

Summary of Economic Costs of Noise

Program or Impact (year price level in parenthesis)	Cost: Per Unit Cost	Average Cost	Total Cost	Other Expression
Airports & Aircraft				
Purchasing of Fly over Easement of two airports[1] - (1969)		$ 1680	$ 104,420	
Litigation of Los Angeles International-1960's (1969)		45,500	2,814,531,725	
Loss of property value[2]				50% lower land values
Schools-relocation-Los Angeles Unified[4] (1968)	$598/student		951,000	
Abatement -Los Angeles Unified[4] (1968)	$324,290/school		9,080,000	
Purchasing of property - The Nation (1968)			26,400,000,000	
Retrofit (1968)			between $3.8 & 5.7 billion	
Airport usage restrictions - DOT-NASA (1969)			11,000,000 annual	20% airport reduced capacity
Sonic Boom Damage - 3 cities (1961,1964,1965)	$116/claim		592,944	
Ground Transportation				
Property value loss			may be no cost-commercial demand near freeways	
Noise easements near freeways - Nations Urban Freeways (1970)			2,680,000,000	
Relocation of people located near Urban Freeways-Nation (1970)			3,930,000,000	
Industrial				
Accidents due to Noise (1968)			213,000,000	
Modification of new equipment				10% increase of unit cost

Source: NATIONAL BUREAU OF STANDARDS (C), 1971
1-Columbus, Ohio and Denver, Colorado
2-Source: HURLBURT, 1972, Page 2.

3. Animal Reactions - Animal reactions to noise such as reduced reproduction, could cause financial losses in many animal related industries.

4. Declining Residential Land Values, Reduced Occupancy and Rents (See Illustration 3.2) - As previously mentioned, the value of land surrounding airports may be reduced. It was observed in the Los Angeles study that even though residential values might be reduced, there could be a potential increase in value for that property for commercial demand for the property, deterioration of the community may occur because further investment in the lowered property value area would not be warranted, or a higher occupancy turnover rate might occur in the noisier areas. The noisier community might then be less stable and "is more likely to deteriorate aesthetically than one which is quiet." (SOURCE: NATIONAL BUREAU OF STANDARDS (c),1971, Pages 22-23).

C. WILDLIFE

Noise can cause certain species of animals (particularly predators) to abandon their habitat. A decrease in predatory species in an area can lead to overpopulation by other non-predatory herbiforous species who might then propagate to such a point that they would deplete vegetation in the area. Hazards associated with soil erosion are greatly increased as vegetation is depleted.

NOISE SENSITIVE LAND USES

The two previous sections have outlined primary and secondary effects of noise. Unless these impacts can be translated into land use information, it will be difficult for planning departments to effectively deal with the situation. The following matrix, therefore, attempts to relate the probable noise impact that is likely to be experienced by representative uses.

Illustration 3.3
Matrix of Noise Impacts on Land Use

		Residential			Commercial			Industrial			Educational				Recreation				Auditorium										
Forms of Primary Noise Impact	Noise * Impact Level	Bedroom	Living Room	Hotel	Restaurant	Offices	Transportation	Research	Light	Heavy	Classroom	Laboratories	Library	Hospital	Sports	Gymnasiums	Playgrounds	Parks-Passive	Assembly Hall	Church	Concert Hall	Mtn. Pic. Theatre	Leg. Theatre	Rural Residential	Suburban Residential	Urban Residential	Parks	Commercial	Industrial
Hearing Loss	MH-H		X				X			X						X										X			X
Speech Interference	L-MH		X	X	X	X	X	X	X	X	X	X		X	X			X		X		X	X	X	X	X		X	X
Sleep Interference	L-MH	X		X										X											X	X			
Annoyance	M-H	X	X	X	X	X	X	X			X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X
Extra Auditory Physiological Effects	MH-H		X				X		X	X				X		X										X		X	X
Psychological Effects	MH-H		X							X				X												X			X
Effects on Natural Resources	M-H																	X						X			X		
Economic Effects	M-H	X	X																										
Effects on Structures	H						X			X															X				X

*L - Low Intensity Noise (50db or below)
M - Medium Intensity Noise (50db to 65db)
MH - Medium High Intensity Noise (65db to 80db)
H - High Intensity Noise (80db or above)

Source: VENTURA COUNTY PLANNING DEPARTMENT

GENERAL EFFECTS

NOISE

The two previous chapters dealt with noise measurements and the effects of noise on various resources or recipients. This chapter which discussed noise evaluation schemes, grows out of these two chapters in the sense that noise evaluation schemes are necessary if we are to meaningfully measure or evaluate noise in light of its affects on people and secondarily animals and structures.

MEASUREMENT VERSES EVALUATION

Noise measurement deals with the basic characteristics of sound: sound pressure, sound power, and frequency. (The decibel, the most well known noise measurement unit, is simply a convenient way of measuring sound pressure and power.) Since noise measurements in decibels by themselves do not provide us with a very complete picture of noise as we perceive it, various weighting scales (the "A" scale being most common) are applied to decibel measurements of noise to produce a truer indication of what we actually hear. At this stage we may know how to measure noise so that it reflects what we hear, but we do not have an adequate measure of noise as we react to it. This is where the various noise evaluation schemes come into play. Noise measurements then, are intended to deal with the basic characteristics of noise, while noise evaluation schemes are intended to relate this information to our lives in a more useable form.

PURPOSES & COMPONENTS OF EVALUATION SCHEMES

The basic purpose of any evaluation scheme is to relate noise information ("measurements") to our lives in a meaningful way. Our determination of what is meaningful can be defined in many ways. Ultimately, what is relevant to us from a noise standpoint is the effects noise has on us and our environment.

While the subtle health effects of noise are important to consider, most people are normally most concerned with the immediate and recognizable effects of noise, namely, speech interference, sleep interference and annoyance. These particular effects are influenced by various factors such as time of day, frequency of the noise and magnitude of the noise. Consequently, an

evaluation of a particular noise effect must take into account such influencing factors. Unfortunately, there is no single evaluation scheme that takes all of these factors into account, and so we must choose between schemes which account for some, but not all the factors in question.

Below is a listing of factors which either influence the effects of noise or the evaluation of its effects. The significance of each factor will be discussed thereafter (Source: WYLE LABORATORIES, (a), 1971, p. 51).

1. Magnitude of the noise with a frequency weighting for hearing response.

2. Duration of the intruding noise.

3. Time of year (windows open or closed).

4. Time of day noise occurs.

5. Outdoor noise level in community when the intruding noise is not present, i.e., ambient noise level.

6. Simplicity of measurement scheme.

7. Measurement over period of time.

8. History of prior exposure to the noise source and attitude toward its owner.

9. Existence of pure tone and impulsive character in the noise.

The ambient, or background noise level which was alluded to above can easily vary with time of day, year, or location. Generally, the higher the ambient level the less one will be affected by intruding noises. This, however, may depend upon the characteristics of the ambient level.

Measuring sound levels over time is extremely important because it is the only way to acquire a full and complete picture of the noise situation. Unless such measurements are taken, there can be no assurance that the readings taken are uncommonly high or low. The ideal measurement would be for 24 hours on various days in different seasons. This, however, is often impossible, and so measurements are sometimes taken at representative intervals throughout the day. Such measurements can be as statistically valid as a 24-hour measurement.

One's history of prior exposure is important to consider when evaluating noise, because people are often affected less if they have been exposed to a given noise before. People may also react differently to a noise with which they have a positive association, such as their pet dogs.

Pure tone or narrow band noises are generally more annoying than are noises of wider frequency bands and so, should be accounted for. Similarly, impulsive noises such as gunshots have a greater capacity to startle people than do noises with less abrupt onsets.

Finally, and perhaps most importantly, any noise evaluation scheme must be relatively simple and easy to use. If it is not, it will not be employed. Thus, lack of a useable noise evaluation system could jeopardize chance of monitoring of the noise situation or enforcement of a noise ordinance.

NOISE EVALUATION SCHEMES

(Source: U.S. ENVIRONMENTAL PROTECTION AGENCY (a), 1973, p. 2-6 to p. 2-8)

While there are a number of noise evaluation schemes, all fall into one of three categories: psychoacoustic, statistical, and time-history. These schemes are discussed below:

PSYCHOACOUSTIC SCHEMES

These schemes attempt to predict a person's reaction to noise based on previously measured human responses to noise.

Perceived Noise Level (PNL)

PNL was developed in the late 1950's by Karl Kryter, a doctor of psychology at the Standford Research Institute, who spent much of his time dealing with human responses to noise. His scheme is expressed in decibels (dB) and, "was intended to present the sound pressure level of an octave band of noise at 1,000 HZ which would be judged equally noisy to the sound to be rated. Equally noisy means that in a comparison of sound one would just as soon have one noise as the other at his home during the day or night".

Over time, Kryter and his associates refined this technique to include discrete frequency components of tones associated with aircraft flyovers. The refinement is referred to as the Tone Corrected Perceived Noise Level, abbreviated as PNLT. Further improvements to the scheme were made when it was determined that long duration flyovers were more annoying than short duration flyovers. As a result, PNLT was modified by Kryter and Pearsons to account for the duration of the noise signal. This new scheme is called the Effective Perceived Noise Level (EPNL) and is somewhat more exact than the A-weighting scale in relating man's perception of aircraft noise. For this reason, it has become a major evaluation tool of the Federal Aviation Administration in the certification of aircraft noise.

For most sounds, the Perceived Noise Level exceeds the A-weight noise level by 13 dB, the differences ranging typically between 11 and 17 dB, depending primarily upon the amount of correction for puretones. The Tone Corrected Perceived Noise Level scale (PNLT) requires complex analysis and instrumentation to define a sound. Thus, it has not been utilized extensively, since in most instances the simple A-weight sound level appears to adequately describe environmental noise at a given location and time and with relatively simple instrumentation.

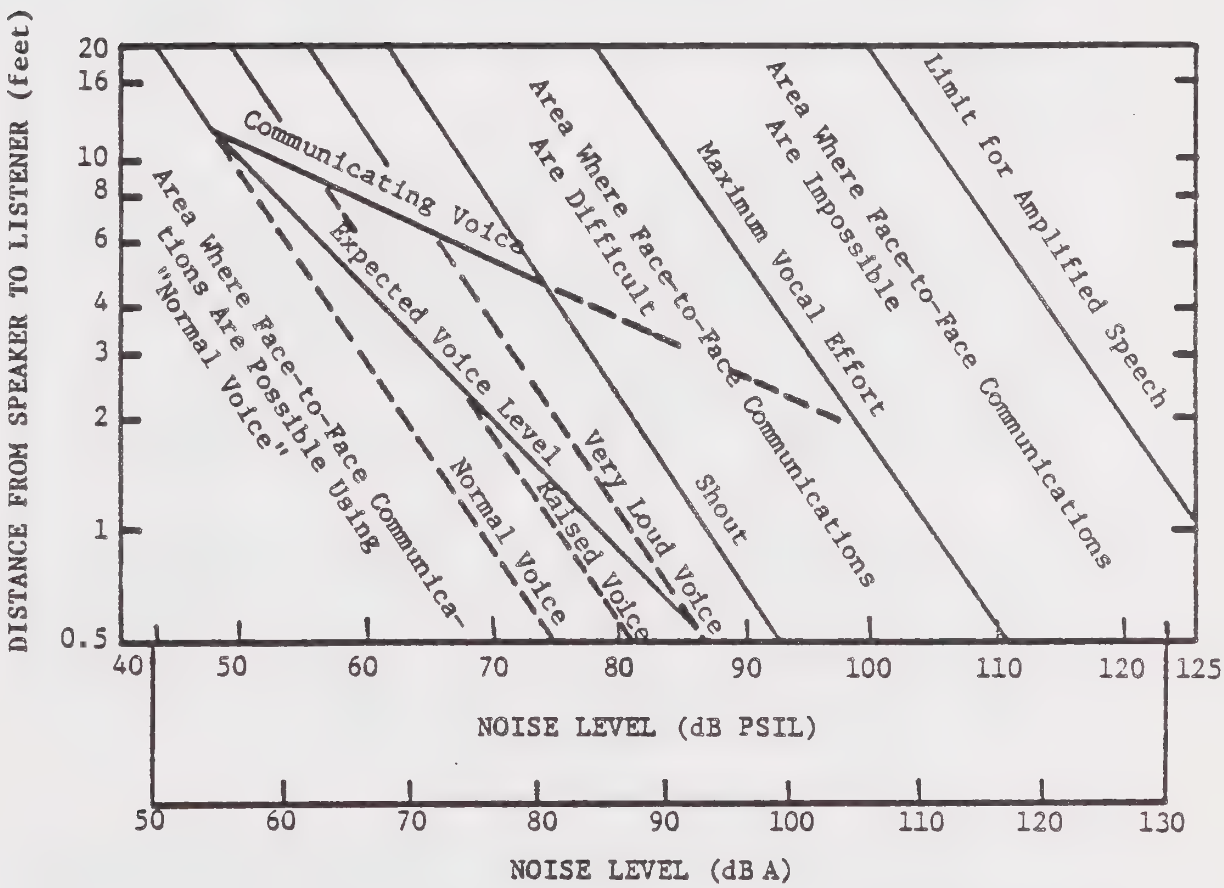
Speech Interference Level (SIL)

SIL was introduced by Leo Beranek in 1947 to evaluate the average general masking capability of the noise. As originally formulated, SIL was defined as the average of the octave-band SPL's in the 600-1,200, 1,200-2,400 and 2,400-4,800 Hz octaves. Since that time, the preferred frequencies for octave bands have been changed. One modern version of the SIL is the average of the SPL's in the three octave bands centered at 500, 1,000, and 2,000 Hz. So many variations in preferred octave bands have been developed that a shorthand notation is now used: SIL (5, 1, 2), this shorthand terminology refers to the three octave bands centered at 500, 1,000 and 2,000 Hz. At the present time, the American National Standards Institute is promoting the acceptance of SIL (.5, 1, 2, 4) as providing the best estimate of masking ability of a noise.

The simple A-weighted sound level (dBA) is also a useful index of the masking ability of a noise and compares favorably with SIL as can be seen on Illustration 4.1. The A-weighting process emphasizes the median frequencies, as do the various SIL's. However, in contrast to most SIL schemes, A-weighting does not ignore the lowest frequencies where speech becomes intelligible.

Illustration 4.1

Speaking Levels Required When Talking Over
Various Distances and Background Noise Levels



Voice level and distance between talker and listener for satisfactory face-to-face speech communication. An example for interpreting this chart: Jet aircraft cabin noise is roughly 80 ± 2 dBA. An 80 dBA in their expected (raised) voice level, seat mates can converse at 2 feet and, by moving a little, can lower their voices to normal level and converse at one foot. To ask the stewardess for an extra cup of coffee from the window seat (4 feet), one would need to use his very loud communicating voice.

Source: NATIONAL BUREAU OF STANDARDS(a), 1971, pg. 29

Illustration 4.1 charts out the speaking effort one must exert when speaking over certain background noise levels and over various distances.

STATISTICAL SCHEMES

These schemes describe the average noise level occurring over a given percentage of time. As such, they are merely statistical representations of noise occurrences; they have no direct relationship to non-auditory human responses to noise as the psychoacoustic schemes do.

Statistical Level

One of the dominant characteristics of environmental noise at any location is that it fluctuates considerably from moment to moment. Thus, to accurately describe noise at a location, a statistical approach that takes time into account must be employed. This can be achieved by plotting a curve that depicts the cumulative distribution of sound levels over time. In doing so, it can be determined what sound levels are exceeded during a given percentage of time. The percentages broken out most often are: 10%, 50%, and 90%. (See Illustration 4.2)

The sound pressure level exceeded 10 percent of the time, expressed as L_{10}, gives an approximate measure of higher level and short duration noise. A measure of the median sound level is given by the L_{50} and represents the level exceeded 50 percent of the time. The ambient sound level is approximated by L_{90}, which is the sound level exceeded 90 percent of the time.

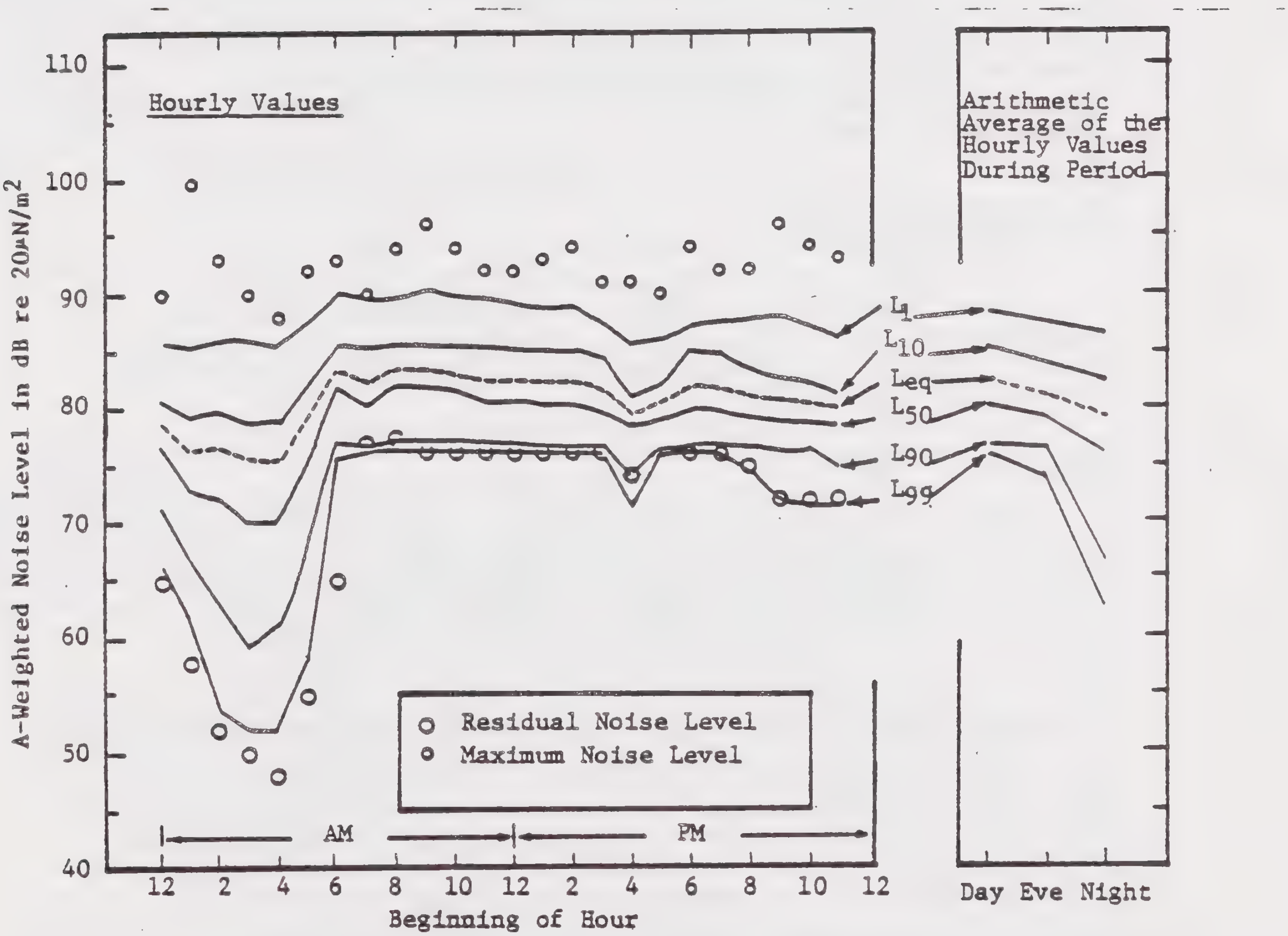
The Energy Mean Noise Level (Leq)

Leq measures the average magnitude of all sounds occurring over a given period of time. It differs from Lx schemes in that the Lx is an arithmetic average of decibels. Leq on the other hand, determines the average of the sound power and therefore takes into account the logarithmic characteristics of decibels. Despite this difference, Illustration 4.2 points out that there is little difference between the two schemes.

In terms of assessing the effects of noise on humans, Leq is one of the most important measures of environmental noise, since there is experimental evidence indicating it accurately describes the onset and progression of hearing loss. There is also evidence that it correlates with human annoyance to noise.

Illustration 4.2

Various Measures of the Outdoor Noise Level



Source: SWING (a), 1974, pg. 8

The statistical measures described above simplify the problem of quantifying environmental noise and are used extensively. However, these measures may be misleading if used exclusively when comparing two environments differing in their noise profiles. For example, one environment could have an L_{50} noise level of 40 dBA with great variations in level while a second environment could have an L_{50} level of 45 dBA comprise of sounds of about the same level. It is quite possible that the quieter environment could have peaks which far exceed the louder environment. Using the L_{50} statistical scheme could not tell you this. These peaks could be detected by using additional measurements, such as L_{10}, L_1, to give a better overall representation of the noise environment.

TIME-HISTORY SCHEMES

These schemes use the various measurement scales (usually "A") to evaluate the sound power of a noise over a period of time (usually 24 hours) with weightings for night-time noises.

Day-Night Average (LDN)

LDN is the energy equivalent or average, A-weighted sound level, taken over a 24-hour period, with a 10-decibel penalty factored into the original Leq sound level measurement for nighttime sound levels. This factoring process makes the LDN somewhat harder to work with.

Composite Noise Rating (CNR) and Noise Exposure Forecast (NEF)

CNR and NEF were introduced in the early 1950's and are similar, except that NEF accounts for both duration and pure tone content of each single event, whereas CNR does not. These two schemes are based on variations in EPNL which is a psychoacoustic scheme.

Community Noise Equivalent Level (CNEL)

CNEL was recently introduced by California and represents the average noise over a 24-hour period with different weighting factors for noise levels occurring during the day, evening, and night periods. Essentially, it is an Leq for a 24-hour period with special corrections of 35 and 10 dB, respectively, factored into the original Leq level for evening and nighttime. This factoring is cumbersome and makes CNEL somewhat difficult to work with. It is designed to account for the increased disturbance caused by noise events during the evening and the night.

Illustration 4.3

Corrections to be Added to the Measured Community Noise Equivalent Level (CNEL) to Obtain Normalized CNEL

Type of Correction	Description	Amount of Correction to be Added to Measured CNEL in dB
Seasonal Correction	Summer (or year-round operation) Winter only (or windows always closed)	0 -5
Correction for Outdoor Residual Noise Level	Quiet suburban or rural community (remote from large cities and from industrial activity)	+10
	Normal suburban community (not located near industrial activity)	+5
	Urban residential community (not immediately adjacent to heavily traveled roads and industrial areas)	0
	Noisy urban residential community (near relatively busy roads or industrial areas)	-5
	Very noisy urban residential community	-10
Correction for Previous Exposure & Community Attitudes	No prior experience with the intruding noise	+5
	Community has had some previous exposure to intruding noise but little effort is being made to control the noise. This correction may also be applied in a situation where the community has not been exposed to the noise previously, but the people are aware that bona fide efforts are being made to control the noise.	0
	Community has had considerable previous exposure to the intruding noise and the noise maker's relations with the community are good.	-5
	Community aware that operation causing noise is very necessary and it will not continue indefinitely. This correction can be applied for an operation of limited duration and under emergency circumstances.	-10
Pure Tone or Impulse	No pure tone or impulsive character Pure tone or impulsive character present	0 -5

Source: Wyle Laboratories (a), 1971, pg. 54

Illustration 4.4

Two Examples of Calculation of
Normalized Community Noise Equivalent Level

Factor	Aircraft Landing Noise in Noisy Urban Residential Community (1)			Traffic Noise in Old Residential Area Near City Center (2)		
	Day	Eve.	Night	Day	Eve.	Night
Energy Equivalent Noise Level (Leq) in dB(A) for Time Period	80	83	75	56	57	53
Duration and Time of Day Corrections Factor[3]	-3	-4	+6	-3	-4	+6
Subtotals which are added Logarithmically to obtain CNEL	77	79	81	53	53	59
Community Noise Equivalent Level	84			61		
Additional Corrections from Table 11:						
Seasonal	0			0		
Residual Noise Level	-5			0		
Experience & Attitude	0			-5		
Pure Tone or Impulse	5			0		
Total Additional Corrections	0			-5		
Normalized CNEL	84			56		
Actual Reaction	Extensive Lawsuits and Political Pressure			No Reaction		

(1) Location F in Figures 7 and 23

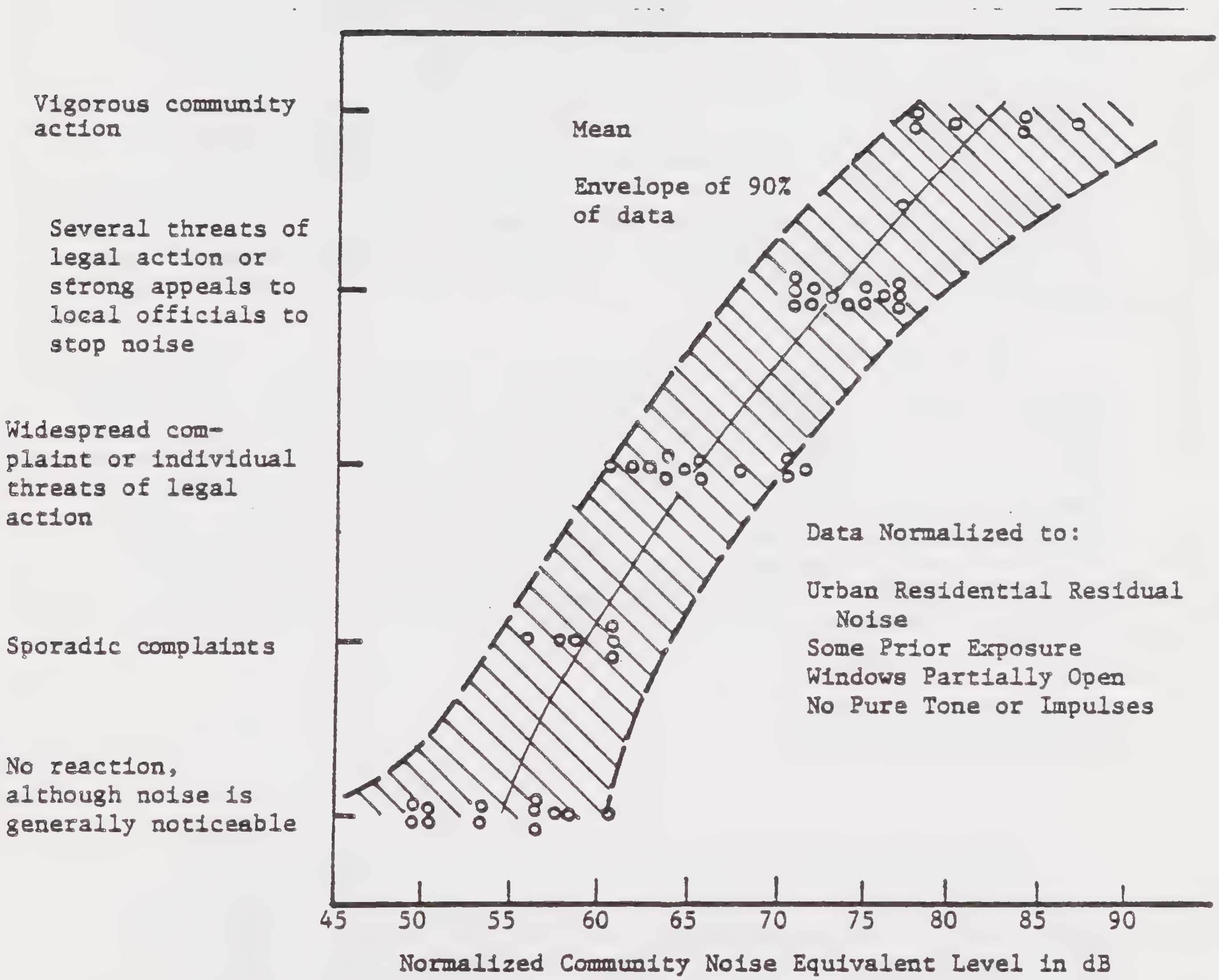
(2) Location L in Figures 7 and 23

(3) Duration correction is $(10 \log \frac{n}{24})$ where n is the number of hours in the period.

Source: WYLE LABORATORIES, (a), 1971, pg. 55.

Illustration 4.5

Community Reaction to Intrusive Noise



Source: WYLE LABORATORIES(a), 1971, pg. 59.

It differs from LDN only in the fact that it has a third weighting for evenig hours.

Normalized Community Noise Equivalent Level (NCNEL)

NCNEL is simply CNEL that has been corrected to take into account tonal qualities, seasonal differences, previous community exposure, etc. Like CNEL, it is based upon an Leq measurement with penalties factored in for day, evening, and nighttime noises. It goes beyond CNEL by adding penalties to the basic CNEL noise level for a variety of community factors. These factors and their respective penalties as outlined on Illustration 4.3 and were derived much like the psycho-acoustic schemes were in that they were correlated with actual human responses to noise. Illustration 4.4 illustrates examples of how a NCNEL level was derived for two environments.

Note how the process begins with a Leq level which is converted to CNEL by factoring in time of day penalties, and finally modified with the addition of penalties to arrive at a NCNEL level. Ultimately, a community response to this level can be gauged using Illustration 4.5 which was correlated with actual community responses to given NCNEL levels. Obviously, NCNEL takes into account most of the factors listed at the beginning of this chapter; all but two - ease of measurement and impulsive characteristics of the noise.

CONCLUSION

Illustration 4.6 summarizes how effectively each of the various noise evaluation schemes dealt with the noise influencing factors cited earlier. These factors reflect our noise concerns, be they nighttime noise, pure tone, long duration, etc. It is evident that no single evaluation scheme accounts for all factors and, consequently, no scheme can adequately address all of our noise concerns.

Generally speaking, the psychoacoustic schemes are fairly complex and are aimed at research into human responses to noise. As such, these schemes are not commonly employed by planning agencies.

The statistical schemes are relatively easy to use and understand and are therefore often used in noise ordinances around the country.

The time-history schemes are relatively simple in concept, but they require numerous computations to arrive at a final figure. This feature makes them less suited for ordinance work than the statistical schemes. Time-history schemes, however, have the advantage of being able to predict community responses to noise. As such, they might be best used for compatible land use planning.

Illustration 4.6
Factors For Ideal Rating Scheme

COMPARISON OF MEASUREMENT FACTOR TO VARIOUS MEASUREMENT SCHEMES	Consider Frequency Weighting For Hearing Response	Consider Duration of Intruding Noise	Consider Time of Year	Consider Time of Day	Detect Background Noise Level	Simplicity of Measurement	Measurement Overtime Period	Consider Community's Prior Exposure	Consider Pure Tone	Detect Noise Impulse
<u>Measurement Schemes</u>										
Frequency Weighted										
"A"	Y	N	N	N	Y		N	N	N	Y
"B"	N	N	N	N	Y		N	N	N	Y
"C"	N	N	N	N	Y		N	N	N	Y
Octave Band	P	N	N	N	N		N	N	N	D
<u>Measurement Evaluation Schemes</u>										
Psychoacoustic										
PNL	Y	P	N	N	N	N	D	N	N	P
EPNL	Y	P	N	N	N	N	D	N	Y	P
SIL	Y	N	N	N	N	Y	P	P	N	Y
Statistical Level										
Lx	Y	Y	N	N	Y	Y	Y	N	N	Y
Leq	Y	Y	N	N	P	P	Y	N	N	P
Time History										
NEF	Y	Y	P	Y	N	N	Y	P	Y	N
CNR	Y	N	P	Y	N	N	Y	P	N	N
CNEL	Y	Y	P	Y	N	D	Y	D	P	N
NCNEL	Y	Y	Y	Y	N	D	Y	Y	P	N
LDN	Y	Y	P	Y	N	D	Y	P	P	N

Y - Yes   P - Possibly   D - Difficult   N - No

SOURCE: Ventura County Planning Department

GENERAL INVENTORY

NOISE

The preceding chapters provided a general understanding of noise. This chapter will identify the general noise sources within the county, as background for the more detailed review of noise sources in a following chapter.

NOISE SOURCES & RECIPIENTS

This element deals with the problem of noise from the standpoint of noise sources or generators, and noise recipients. This distinction is somewhat artificial, because recipients can be sources as well. Nevertheless, typology provides a convenient way of examining the problem.

Illustration 5.1 summarizes the major generators within the county. Three major noise sources are identified: people, transportation and machinery. Corresponding to each type of source is information on the characteristics of the noise it produces, specific uses which might generate the noise and finally, some sample noise measurements taken of sites within the county. These measurements, however, are incomplete and are provided to give a general indication of the noise levels associated with various uses.

For future reference it should be noted that there are primary sources from which noise directly radiates, and secondary sources which do not generate noise themselves, but attract uses which do. For instance, a shopping center is primarily a secondary source because by itself it does not generate much noise. The traffic attracted to the center is considered a primary noise course.

PAST NOISE LEVELS

To provide us with a perspective of our present noise levels, a review of historic levels would be instructive. Illustration 5.2 contains sound level readings from various areas of the county. They were compiled by L. C. McGahan, an acoustical engineer at Point Mugu and represent the extent of our historic noise data. As near as possible, the readings represent noise levels at the same place. The increases over the 10-year interval in some cases correspond to the 1 dB average annual increase nationwide.

Illustation 5.1
Summary of Types of Noise Generated

	How Generated	General Sound Character: Frequency	Duration	Intensity	Uses Which Might Generate Noise	Illustrative Reading (10 Minute Period)
People	Noises generated by human effort without mechanical assistance might include talking, argument, children at play	Wide band middle frequencies	Intermittent	Moderate	Residential, parks, entertainment, elementary, junior and senior high schools, colleges, meeting centers, neighborhood commercial, churches, transit terminals	At Washington Elementary School Playground (Thompson Blvd., Ventura) L_{10}=75dB(A) L_{50}=61dB(A) L_{90}=50dB(A)
	Large mass events such as sporting events	Wide band middle frequencies	Intermittent	Moderate to loud		
	Musical instruments	Tonal-variable	Intermittent	Moderate to loud		
Transportation	Noises generated by transportation vehicle might include: Cars & Motorcycles	Wide band middle frequencies	Intermittent to constant	Moderate to high	Primary Uses (uses where these noises are generated from): airports, railroad tracks, switching yards, & stations, roads, parking structures; Secondary Uses (uses which attract these vehicles): large residential tracts, multi-family, regional parks, high schools & colleges, office bldgs., strip commercial, heavy industry, warehousing, contract constr., oil storage fac., packing plants, hotels/motels, hospitals, service areas.	1. Short Passenger Train from Carpinteria to Oxnard peak at 100' from tracks 73 dB(A) 2. Traffic at Ventura Blvd. & Lewis Road in Camarillo L_{10} = 72 dB(A) L_{50} = 64 dB(A) L_{90} = 55 dB(A)
	Trucks & Busses	Wide band lower freq.	"	High		
	Piston airplanes	Wide band lower freq.	Constant	High		
	Jet airplanes	Tonal lower freq.	Constant	High		
	Helicopters	Wide band middle freq.	Intermittent	High		
	Trains	Wide band lower freq.	Intermittent	High		
Machinery	Noises generated by machinery might include: power saws, planers, transformers	Narrow band	Constant	Moderate to high	Residential, police & fire stations, parks, schools, some meeting centers, office bldgs., grocery stores, wholesale/warehousing, auto & truck repaid, constr., "heavy" industries*, processing plants, mining oper., bus, truck, train & airplane terminals, harbors, oil drilling & compressor sites. *"heavy" industries means any fixed location industry which has heavy equipment.	1. 3rd. Street & Wilson Ave., in Oxnard, measurement of an ice company L_{10}(traffic influ.)= 76 dB(A) L_{50}(co. influ.) = 70 dB(A) L_{90}(co.influ.) = 68 dB(A) 2. Sand & Gravel operation in Moorpark L_{10}(traffic influ) = 83 dB(A) L_{50}(traffic, Co.influ)= 72 dB(A) L_{90}(traffic, Co.influ)= 61 dB(A)
	Sirens	Narrow band	Intermittent	"		
	Punch Pressor, riviting, pile drivers, hammers	Wide band	Impulse	High		
	Heavy constr. equipmt., loaders & compactors, power saws, chainsaws, sirens, radio, T.V., compressors, discharge ducts, cooling towers	Wide band	Intermittent	Moderate to high		

Source: VENTURA COUNTY PLANNING DEPARTMENT

Illustration 5.2
History of Noise In Ventura County

	Sound Pressure Level-1961/1962	Sound Pressure Level 1971	Change
Oxnard	55.5 dB	65.0 dB	+9.5 dB
Ventura	52.5	61.0	+8.5
Camarillo	51.5	58.0	+6.5
Port Hueneme	54.5	58.5	+3.7
Ojai	50.0	53.75	+3.75
Point Mugu	52.5	60.0	+7.5
Camarillo State Hospital	48.5	49.0	+0.5

Source: MCGAHAN, 1971, pg. 16

NOISE SOURCES & STUDY ZONES

This section will discuss significant noise sources within the county and the study zones that surround them. In most cases, the sources under discussion have not had actual noise measurements taken of them, but instead have had theoretical noise levels generated for them by one of several means. Such noise levels, expressed as contour lines around the source, should be considered an initial step in defining the extent of a source's noise radiation.

For the present, the contour lines around the various sources should be considered study zones within which specific acoustical studies should be undertaken to determine the exact noise conditions surrounding a given source or recipient. Such studies may be undertaken for informational reasons only, or in response to an adopted ordinance which has established certain noise levels which must be adhered to. The study zones vary in accordance with the noise source and will be discussed when addressing the various sources.

The significant noise sources within the county will be discussed by noise type, beginning with transportation. Reference should be made during these discussions to the county-wide maps enclosed and to detailed maps of the various jurisdictions.

TRANSPORTATION

Transportation generated noises are by far the most pervasive sources within the county. Among the transportation sources, vehicular traffic creates the greatest impact on the county's resources.

Highways, Roads, Streets

The 65 dB(A) contour line was used for analysis purposes, both because it is the level specified in Government Code Section 65302(g) and because it is the level above which the Department of Housing and Urban Development will not consider making financial commitments. This 65 dB(A) contour line was also the lowest sound level contour consistently provided by all input agencies. The contours were plotted for freeways, highways, and selected roadways and streets.

The contours generally represent peak noise impact of one truc, on that facility. Under the worst conditions (on-grade roadways) the 65 dB(A) mean truck level extends approximately 550 feet from the edge of the pavement, creating contours of 1,100 in total width. The countywide maps in this report illustrate the general noise impact of contoured roads in Ventura County. While the original noise maps for particular roadways within various jurisdictions should be used to establish the more precise location of contours. The derivation of the contours for the various thoroughfares are discussed below.

State Highways and Freeways

District Seven of CALTRANS provided information on State Highways and Freeways. The contours represent the peak mean diesel truck level. A variation of ± 6 dB(A) is built into this contour and is therefore assumed to incorporate possible variation between present and future traffic volumes. The contours reflect topography and other right of way influences on noise attenuation (i.e., elevated or depressed roadways). Noise barriers, such as structures, beyond the right of way were not considered. Proposed routes were plotted, when an adopted alignment was known.

County Roads

Contours for county roads were developed by the Ventura County Public Works Department using the same methodology devised by District Seven of CALTRANS. This included a series of templates based on Test Method Number California 701-A's nomographs. These templates summarized the noise attenuation for several types of

roadways ranging from 20 foot depressed to "on-grade" to 20 foot fill. As "on-grade" represented worst case conditions, this template was used to determine noise contours on County Roadways. These contours represent the same peak mean diesel truck level variation ($\pm$6dB(A)) as in the State Highways and Freeways. It does not reflect topographical and other right of way influences. Present and future routes that have definite alignment proposals were plotted.

City Streets

Contours for city streets were prepared by the respective cities' Public Works or Planning Departments in the same manner as the County Road contours, with the exception of the City of Thousand Oaks where right of way topography, structures, and speed influences were also considered.

Airports

The contours around airports differ from those around highways in that they are not based on peak noise levels, but rather on noise levels over time with weightings applied for daytime, evening, and nighttime hours. These contours are intended to better reflect the communities reaction to noise than are peak level contours. Generally, the location and size of airport contours are based on airport flightpaths, type or size of aircraft, and number of operations. Area covered by the contours represents the noise patterns of landing, takeoffs, and flight patterns of airplanes using the facility.

Two contour levels were used: 55CNEL and 65CNEL. The 55CNEL contour was used because it indicates the greatest area which may be impacted by the various airports. For consistency, this contour was plotted for each airport. Because no formal 55CNEL contours had been plotted for Poing Mugu, Santa Susana, or Santa Paula Airports, one was approximated for each facility. A 65 dB contour is required by law to be in the element and so a 65CNEL contour is also shown for each airport. This contour is also used by the Department of Aeronautics to determine where residences without sound insulation should be located.

NOTE: The following criteria was used to help determine which roads to contour; they were not necessarily used by each entity. (1) Roads of 50 mph having a traffic count of 280 vehicles per hour. (2) Roads of 30 mph having a traffic count of 490 vehicles per hour. (3) Roads of 50 mph having a truck count of 48 vehicles per hour. (4) Roads of 30 mph having a truck count of 38 vehicles per hour. Using these criteria, a peak 65 dB(A) contour could be approximated.

Pt. Mugu - This facility's noise contours were created by Holt, Beranek and Newman in "Noise from Aircraft Operations - Naval Air Station Point Mugu, California". This study expressed contours on the basis of Composite Noise Rating (CNR) at the 100 and 115 dB level, instead of CNEL (see Chapter III for difference between these noise measurements scales). The 55CNEL contour was estimated by the Ventura County Environmental Resource Agency at the request of Ventura County Airports and Harbor Department. This is only an approximation of the 55CNEL contour and should only be used to determine areas for future noise studies. Only present day operations are shown as there will be no foreseeable change in extent of operations.

Ventura County Airport - The 55CNEL contour was created by Wyle Laboratories as cited from the City of Oxnard Planning Department's document, "The Proper Role for the Ventura County Airport at Oxnard". This report shows three levels of operation: 306, 540 and 810 average daily operations. Using information provided by Ventura County Airports and Harbors, it was determined that at the present time there are approximately 450 daily operations based on annual averages. The 540 daily operations contour line was therefore used to represent the present noise levels, while the 810 average daily operations contour line was used to represent potential operations. The Ventura County Airports and Harbors Department furnished the 65CNEL contour of the facility which reflects the above operation levels.

Oxnard Air Force Base - Wyle Laboratories created noise contours for this facility based on Adrian Wilson Associates' Camarillo Airport Environmental Impact Statement dated 1970. This study showed several sets of contours based on a variety of aircraft operations. One of these operation levels was recently revised by the Board of Supervisors.

According to "Revised Application of the County of Ventura for the Oxnard Air Force Base" as prepared by Ventura County Airports and Harbors Department and adopted by the Board of Supervisors on May 15, 1973, operations shall not exceed 28 two-engine jet operations per day. However, it should be noted that this level of operation does not saturate the facility's potential capacity. Due to the lack of knowledge of the total capacity of the facility and Board of Supervisors' resolution (File No. 202.200), the contours representing the 28 two-engine jet operations were used because it describes the most probable level of operations known at this time.

The contours prepared by Wyle Laboratory represents the following operations levels: 28 two-engine jets, 26 twin otter and 306 general aviation (no jets) daily operations. These were expressed as potential 55 and 65 CNEL contours, due to the current non-operational status of the airport. It has not yet been resolved as to whether the facility will become operational again.

Tierra Rejada - Noise contours for the proposed Tierra Rejada facility were created by Hydrospace Research Corporation. The 55 and 65 CNEL contours were taken from the "Environmental Impact Study of the proposed Tierra Rejada Airport", October 1971, prepared by the Department of Airports and Harbors.

Santa Susana and Santa Paula Airports - The contours for Santa Susana and Santa Paula airports were developed by the Ventura County Planning Department. The 65 CNEL contour was developed in accordance with a methodology described in Wyle Laboratories "Simplified Procedures for Estimating the Noise Impact Boundary for Small and Medium Size Airports in the State of California", May, 1973. The 55 CNEL contour is an approximation based on an extrapolation of the 65 CNEL contour. Data on daily operations were provided by the respective airport managers and reviewed by Ventura County Airports & Harbors Department.

Railroads

There are two classifications of railroad noise: line haul and yard operations. Line haul operations are best typified by high speed freight and passenger trains. Yard operations are related to switching and locating box cars at industries. Similar to airports, the 55 and 65 CNEL or Ldn contours have been computed for line haul and yard operations. Line operations were determined by the procedure established in "Wyle Research Technical Memorandum Number 59197-1", dated March 15, 1974, which deals with a simplified procedure for assessment of noise emitted by on-line railroad operations in the "Assessment of Noise Environment Around Railroad Operations", dated July, 1973. Contrary to the State Government Code 65302(g), contours were developed for the Ventura County Railroad by the Ventura County Planning Department, due to the lack of resources available to that railroad company. For line haul operations, the 55 Ldn is 250 feet from the track for four operations occurring between 7:00 a.m. and 10:00 p.m., while yard operations extend 1,000 to 1,200 feet from the tracks. These contours reflect potential as well as existing conditions as the company did not foresee a change in operations.

Initially, contours were expected from the Southern Pacific Transportation Company in compliance to the aforementioned government code. Unfortunately, contour information was not received from the company. Based on the procedures used for line haul operations, the 55 and 65 Ldn contours were then developed by the Ventura County Planning Department. The 55 Ldn contour lies 1,500 feet from the tracks and is considered a worse case situation for the county. This contour is based on an average of 15 operations per day with 11 operations occurring between the hours of 7:00 a.m. to 10:00 p.m., while yard operations extend 1,000 to 1,200 feet from the tracks. These contours reflect potential as well as existing conditions as the company did not foresee a change in operations.

Initially, contours were expected from the Southern Pacific Transportation Company in compliance to the aforementioned government code. Unfortunately, contour information was not received from the company. Based on the procedures used for line haul operations, the 55 and 65 Ldn contours were then developed by the Ventura County Planning Department. The 55 Ldn contour lies 1,500 feet from the tracks and is considered a worse case situation for the County. This contour is based on an average of 15 operations per day with 11 operations occurring between the hours of 7:00 a.m. to 10:00 p.m. and 4 operations from 10:00 p.m. to 7:00 a.m. and consider additional noise due to steel trestles. This reflects the highest number of operations which occur within the County (Santa Barbara County line to the Oxnard freight yards). The operation figures were obtained at the Yardmaster office at the Oxnard Freight Yard. The yard operations, though, were not calculated because of the need of more detailed information and lack of sufficient time. Until the appropriate calculations can be made, an interim 55 CNEL contour of 2,500 feet from the tracks has been estimated.

Secondary Sources

Most secondary sources are traffic related. Shopping and commercial centers, for example, do not generate very much noise except for their air conditioning or refrigeration units, but they do attract considerable amounts of traffic. For this reason, all major commercial uses were plotted on the noise contour maps as potential noise sources. No contours were drawn around these uses because of their generalized location on the map. It was felt, however, that a noise evaluation noise zone of 1,000 feet should be defined around each source. Other secondary traffic related sources include: schools, large industrial concerns, and parks.

MACHINERY

Machinery is a second major source of noise within the County and is usually associated with industry. An attempt was made to locate potentially noisy industrial uses by using the Regional Transportation Study's 1973 land use map and the 1971 Ventura County Standard Industrial Code (SIC) guide. Potentially noise uses were selected from the SIC guide and plotted on the noise contour map. This information was supplemented by data from knowledgeable people from local jurisdictions. No contours were designated around these uses because of the uncertainty that they are in fact noise producers. A study zone of 1,000 feet around each use is suggested as an area to begin any further studies of the use.

PEOPLE

People are not usually considered noise sources, and rightly so, because they generate far less noise than do the other sources mentioned thus far. It should be remembered, however, that they are at the heart of all the noise generated. People drive cars, ride in aircraft, and operate machines; they also require the services and products which directly produce noise. Among the uses which do actually generate human noise might be mentioned: school and playgrounds, stadiums and parks.

NATURE OF INFORMATION

The pervious section in this chapter outlined the major types of noise sources within the county and located them on a county-wide map and on local, jurisdictional maps. This section is intended to inform the reader of the nature of the information that went into the various inventories thus far compiled. This is done to provide a better perspective of the problem and to assist in decision making.

The reliability of the information used in plotting contours is less than ideal because of the number of sources relied upon for information, the various evaluation schemes in which the information appeared, and the probable lack of consistent measuring techniques. Such a situation is unavoidable, but should not in any way detract from the use of the plotted contours as analysis or study zones. Within these zoned further noise investigations should be undertaken to determine the exact nature of the source in question.

Besides their reliability, the appropriateness of the contours for land use decisions is also in question. A perfect example of this is the use of the average peak level of a diesel truck as a basis for traffic noises. Such a method does not take into account volumes or mixes and, consequently, depicts Highway 150 as being as noise as Highway 101. None of the contours take into account noise barriers such as buildings, or the noises generated by sources other than those being represented. Finally, none of the contours consider noise levels over a 24-hour levels, but neither accounts for both of these noise factors.

The spot measurements taken at selected locations and addressed more fully in the Local Inventory chapter, represent a few of the actual measurements taken in the county. However, they were not extensive enough to warrant their use as anything but general indicators.

In general, there is very little hard, field-generated data on noise for this county. What appears in this Element represents the best available information; information which should not be used for land use decisions but rather as a general guide for more detailed studies.

LOCAL INVENTORY OF SOURCES

NOISE

LOCAL INVENTORY

The previous inventory of noise sources and the resources they impact was general in nature and attempted to provide a county-wide view of the noise problem. This chapter will discuss in greater detail, the potential noise sources and recipients in the County's jurisdiction. Reference should be made to the noise sources maps.

There are two types of noise generators considered in this chapter: extreme and common. The extreme noise generators are listed on Illustration 6.1. While few in number and generally lying within incorporated areas, they nevertheless affect unincorporated territory. The two power generating plants are examples.

The extreme and common potential noise sources and the resources they impact are listed on Illustration 6.2. In some cases, sources were listed which are located outside the unicorporated area, but which affect areas within County territory. The proposed airport at Oxnard Air Force Base is an example.

Potential impacts of resources by noise sources was inventoried by first identifying suspected and known noise sources; second, designating noise contour levels or study zones around each prospective source; and finally by identifying the resources found within these contours or zones.

The potential noise sources inventoried were selected because their consideration was required by State law, or because complaints and past experience indicated they were likely noise sources. It should be noted that relying on complaints to direct investigations will result in an incomplete study of the problem, because complaints are usually lodged in the most extreme cases. The identification of potential industrial noise sources relied upon an inventory of County industry (by Standard Industrial Code - SIC) conducted by the California Human Resources Development Department. Supplemental data was supplied by the land use maps prepared for the Regional Transportation Study.

The noise contour levels around various sources vary considerably and are discussed in detail in the General Inventory of Noise Sources chapter. The contours around highways represent a peak noise level of 65 dB(A), for one average diesel truck. Contours around the various airports were set at 55 CNEL, though some of the contours were extrapolated or interpreted from other noise levels. Contours around the Southern Pacific Railroad were also set at 55 CNEL.

No contours were drawn around spot sources because of the difficulty of plotting them at the map scales used, and because of their tentative nature. Study of analysis zones were established around such sources at a distance of 1,000 feet, which is a sufficient distance to reduce the sources noise level by 35 decibels. For certain extreme noise sources (See Illustration 6.1) greater zones were established.

Another aspect of the local inventory involved a series of spot measurements taken at various locations throughout the County, see Illustration 6.3. These ten minute readings were taken by the County Environmental Health Department and reflect the ambient noise level (L90), intrusive noise level (L10) and the median noise level (L50). Previous readings are also included which were taken in response to complaints and therefore do not include all three statistical levels. While the measurements were statistically significant enough to represent a one hour measurement, they should only be considered a cursory assessment of the situation.

Despite the uncertainty of the noise information presented in this chapter, it does indicate locations where futher noise investigations should be made. A more detailed study could determine the presence or degree of a noise problem. Such investigations might be undertaken as a part of the EIR process or staff review of a project.

Illustration 6.1
Summary of Extreme Noise Generators
in Ventura County and Analysis Zone Used

Generator	Source of Noise	Frequency of Occurrance	Analysis Zone
Rocketdyne Test Facility	Rocket booster testing	Very infrequent	5 miles
Orman Beach Generating Plant	Generator & Blow-off	Blow-off: Intermittent Generating: Continuous	1 mile
Mandalay Generating Plant	Generator & Blow-off	Blow-off: intermittant Generator: peak generating hrs.	1/2 mile
Arcturus Drop Forge	Impulsive Drop Forge	Intermittant	1/2 mile

Illustration 6.1 (Con't.)

The distances are approximations by the Ventura County Environmental Resource Agency based on previous noise data and actual observations. Most generators are outside the County's jurisidiction, but do impact unicorporated areas.

Illustration 6.2

Resources Impacted

COUNTY POTENTIAL NOISE SOURCES	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
Oil Fields										
Tapo Canyon								Gental Acres		
So. Piru										
No. Piru										
No. Fillmore										
Fillmore										
So. Fillmore										
So. Santa Paula										X
Santa Paula-Ojai				Summit						
Ojai			Soule							
N. Ventura Ave.										X
Santa Clara River Mouth			McGrath State Beach Olivas Park Golf Course							
Mandalay	X	X							X	X
El Rio	X	X		El Rio					X	X
Oxnard Plains				Channel Island High School						X

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted: SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
Industrial										
Adjacent Ojai: South of Mira Monte	X			Mira Monte					X	
Oak View	X			Oak View			Ojai Valley Gardens		X	
Adjacent to Ven:										
Ventura Ave area	X			Mill						
Montalvo										
S.P.-101 Fwy.									X	
Bristol	X			Montalvo					X	
Adjacent to Oxnard:										
Oxnard Rose Ave. & 101 area									X	
Nyeland Acres	X								X	
East 5th Street										
Sturgis & Rice										
Sturgis										
*Mandalay Power Plant										
El Rio:										
Vineyard near Central Ave.										
Central Avenue	X								X	
Vineyard near L.A. Ave.										
Saticoy area:	X			Saticoy			Saticoy Rest Home		X	

*Extreme Noise Generator (See Illustration 6.1)

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
<u>Industrial (Cont.)</u>										
Adjacent Santa Paula:										
North of S.P.	X									
East of S.P.										
West of S.P.	X									
Piru proper	X								X	
South Piru									X	
Las Posas:										
Bradley & L.A. Ave.	X									
Moorpark:										
Shekell Road										
L.A. Ave.	X									
S.R. 23	X			Moorpark HS						
East of, near S.R. 23	X								X	
Somis Area	X								X	
Adjacent to Simi:										
Tapo Cyn.										
West of, no. L.A. Ave.	X									
Rocketdyne Test Facility	X			Royal H.S. Simi Valley High School	Adven-tists	Adven-tists Exten-sion		Gental Acres	X	X
Oxnard Plains:										
Laguna & Pleasant Valley										

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted									
	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
<u>Industrial (Cont.)</u>										
Laguna & Wood										
S.R. 1									X	
Las Posas & Cawelti										
*Arcturus	X									X
Ormond Beach	X									X
Newbury Park:										
Rancho Conejo Blvd.										
Old Conejo Road	X			Newbury Park Walnut					X	
Camino Dos Rios	X									
Lawrence									X	
North Half:										
Monolith										
Shadow										
Ridgelite										
<u>Commercial</u>										
Oakview	X			Arnaz						
Mira Monte	X									
Moorpark	X			Flory Poindexter						X
<u>Schools</u>										
Oakview:										
Mill School										
Santa Ana	X									

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted: SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
Schools (Continued)										
Oak View	X									
Arnaz	X									
Ojai:										
Mira Monte	X									
Meiners Oaks	X							Valley Ranch Home		
Monica Ros	X									
San Antonio	X									
Villanova										
Ojai Valley	X								X	
Thacher	X									
Happy Valley										
Summit	X									
Santa Paula:										
Mupu	X									
Santa Paula										
Renaissance High	X								X	X
Santa Clara										
Briggs										
Olivelands										
Fillmore	X									X
Piru	X								X	
Moorpark:										
Poindexter	X			Moorpark H.S.						X
Flory	X								X	
Moorpark H.S.	X			Poindexter					X	X

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
							Resources Impacted			
Schools (Continued)										
Moorpark CC										
Thousand Oaks:										
St. Pascal Baylon	X								X	
La Reina H.S.	X									
Redwood	X									
Acacia	X									
Madrona	X									
Newbury Park:										
Newbury Park Ac	X									
Walnut	X									
Newbury Park HS	X								X	
Sequoia	X					Mary Health of the Sick				
Manzanita	X									
Banyon	X									
Camarillo:										
Camarillo H.S.										
St. John's										
Camarillo Heights	X					Pines Guest Home				
St. Columbia	X									
Somis	X									

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted									
	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
<u>Schools (Continued)</u>										
Oxnard Plains:										
Laguana Vista										
Oxnard:										
Channel Islands	X									
Hueneme High	X								X	
Santa Clara High	X								X	
Oxnard High	X									
Hollywood Beach	X									
Girls State Sch.										
El Rio:										
El Rio	X									
Rio Plaza	X									
Rio Del Valle	X									
Rio Real	X								X	
Rio Mesa High	X									
Linda Vista Jr. Academy	X									
Mesa										
Ventura:										
Montalvo	X									
Ventura CC	X								X	
St. Bonaventure	X								X	
Buena High	X								X	
Ventura High	X								X	

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted: SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
__Airports__										
Ventura Co Airport - 55 CNEL	X			Oxnard High					X	
Oxnard A.F.B.- 55 CNEL	X									X
Point Mugu- 100 CNR	X			Laguna Vista					X	X
Santa Paula- 55 CNEL	X								X	X
Santa Susana- 55 CNEL	X								X	
Tierra Rejada- 55 CNEL										
__Parks__										
Lake Casitas										
Foster										
Camp Comfort										
Sarzotti	X								X	
Soule	X								X	X
Steckel										
Ventura Beach										
Arroyo Verde	X									
S.P. Rec. Center	X									
Lake Piru										X
Los Robles Golf Course										
Lake Sherwood	X									
Sycamore Canyon										

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted: SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
Parks (Continued)										
Port Hueneme Pier		X								
McGrath State Beach										X
Elkins Ranch Golf Course										X
Wildwood Park				Cal Luthran College						
Roads										
S.H. 150	X	X	Casitas Steckel	Santa Ana Ojai Valley		St. Joseph			X	X
S.H. 33	X		Foster	Mill Mupu Summit Mira Monte Villanova			Lomita Lodge		X	X
S.H. 101	X	X	Ventura Beach	Rio Real					X	X
S.H. 34	X								X	X
S.H. 1	X		Sycamore						X	X
S.H. 1 proposed	X									X
S.H. 118	X								X	X
S.H. 118 proposed	X									
S.H. 232	X			El Rio						X
232 proposed	X								X	
S.H. 126	X			Santa Clara					X	X
126 proposed										
S.H. 23	X		Elkins Ranch Golf Course	Flory					X	X

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted									
	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
<u>Roads (Continued)</u>										
Moorpark Fwy 23 proposed	X									
La Luna Ave.	X								X	X
Santa Ana Road	X		Casitas							
Santa Ana Blvd.	X			Oakview					X	X
Burnham	X						Ojai Valley Gardens			
Hermosa										
Old Creek Road	X									
Ventura Avenue	X			Mill					X	X
Poli Street	X									
Main St-Ventura	X								X	
Foothill Road	X		Arroyo Verde	Olivelands						
Seaward Avenue										
Victoria Avenue	X								X	
Telegraph Road	X			Briggs						
Telephone Road	X								X	X
Kimball Road	X									
Wells Road	X									X
Aliso Canyon										
Olive Road										
Briggs Road				Briggs						
Peck Road	X									
S. Mountain Rd.										
Balcom Cyn Rd.										

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted									
	SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
Roads (Continued)										
Sycamore Road										
Grand Avenue										
Guiberson										
Torrey Road										
Piru Canyon Rd.	X		Lake Piru							X
Olivas Park Dr.										
Harbor Blvd.	X		McGrath State Beach							X
Gonzales Road	X								X	X
Rose Avenue	X			Rio Del Valle					X	
Central Avenue	X			Rio Mesa						X
Santa Clara Ave.	X								X	
La Vista Avenue										
La Loma Avenue										
Walnut Avenue										
Price Road										
Aggen Road										
Bradley Road										X
Berylwood Road										
Stockton										
Shekell Road										X
Tierra Rejada Rd	X								X	
Tapo Canyon Rd.							Gentle Acres			X
Madera Road	X									

Illustration 6.2 (Continued)

COUNTY POTENTIAL NOISE SOURCES	Resources Impacted SINGLE FAMILY	MULTI-FAMILY	PARKS	SCHOOLS	HOSPITALS	CONVALESCENT	REST HOME	MENTAL CARE	COMMERCIAL	INDUSTRIAL
<u>Roads (Continued)</u>										
Rancho Conejo Blvd.									X	X
Borchard Road	X			Sequoia		Mary Health of the Sick			X	
Reino Road	X								X	
Potrero Road	X			Banyon	Cam. State					
Santa Rosa Road	X			Santa Rosa						
Las Posas	X			St. Columbia					X	x
Arnell Road	X								X	
Carmen Road	X								X	
Lewis Road									X	X
Pleasant Valley	X									X
Cawelti Road										X
Laguna Road										X
Etting Road				Laguna Vista						
Hueneme	X								X	X
Wood Road				Laguna Vista						
Rice Road										X
Saviers Road										
Channel Islands										
Ventura Road										
Ventura Street Fillmore	X									
<u>Railroads</u>										
Southern Pacific	X	X		Briggs/Flory Santa Clara Poindexter Moorpark High						

Illustration 6.3

Spot Noise Measurements

Time of Day	Location	Source	L_{90}	L_{50}	L_{10}
8:30 AM	Tapo Canyon Road	Bulldozers Trucks	58	63	73
4:30 PM	Seacliff (101)	Traffic Train	54	60	69
10:00 AM	Conrock, Los Angeles Ave.	Traffic Loading chute	61	72	83
Morning	Piru Canyon Road		35	--	--
"	Lake Casitas Entrance		62	--	--
"	Lake Casitas Boat Ramp		60	--	--
"	Lake Matilija		40	--	--
"	Santa Ana Road		40	--	--
"	La Luna-Roblar		40	--	--
"	Santa Ana-Burnham		45	--	--
"	Briggs Rd. and Foothill		35	--	--
Afternoon	Highway 126	Camper	--	--	42

Based upon an analysis of the preceding information, we find that the following noise generators impact a variety of noise sensitive uses within the unincorporated areas of the County.

Oil Fields

Oil fields in Ventura County appear to have limited impact except near urban areas in Oxnard. Several schools and parks may be impacted by the machinery type noises generated from oil facilities.

Industrial

From Illustration 6.2, it appears that industrial areas may impact residential uses the most while also possibly impacting several schools. This may be from plant operations and heavy machinery associated with them.

Commercial

The three commercial areas in the unincorporated portions of the County exist around urban development.

The traffic they may attract or machinery which may operate at these facilities may impact the surrounding residential areas. The Oak View and Moorpark commercial areas also seem close to school facilities as well.

Schools

With the exception of Santa Clara and Briggs schools, it appears from the County map and resource overlays that schools tend to locate in the midst of residential areas. In some cases the schools may be adversely affecting these areas as it related to noise. Schools may also impact commercial areas and, in some circumstances, health facilities and other schools. Erratic noises from children playing and automobile traffic which is attracted may be the cause of any impact.

Parks

From the County map, it appears that parks tend to develop both near urban and rural areas. Parks near urban areas potentially impact residential areas in a manner similar to the impact of schools. Parks located in rural areas appear to be isolated.

Airports

Based upon flight path configurations, five out of six airports in the County have the potential of impacting some type of urbanization, particularly residential and commercial areas as well as one school.

Roads

Roads play a major role in establishing a community's background or residual noise level and are prime contributors to intruding noises. Because many resources are oriented to this mode of transportation, all the types of resources inventoried may be impacted by roadway noise.

Railroads

From the County map, it appears that the Southern Pacific Railroad mainly impacts agricultural areas within the unincorporated areas of the County. However, several schools and residential areas in the La Conchita, Solimar and Moorpark areas may be impacted.

Conclusion

Due to its pervasiveness, traffic generated noise is probably the largest source of noise in the unincorporated areas of the County. It appears that industry is the second largest noise source due to their distribution and relative high noise levels. Airports may be the third

largest noise generator because of the potentially high noise levels which they could emit. This does not mean that airports may be less of a problem than roads. Each area of the unincorporated areas of the County must consider its particular noise problem and take the appropriate steps to alleviate it.


SANTA BARBARA COUNTY
PACIFIC
OCEAN
PACIFIC
OCEAN
OXNARD
THOUSAND OAKS
LOS ANGELES
COUNTY
PARK
COMMERCIAL AREA
INDUSTRIAL LOCATION
HIGH SCHOOL OR COLLEGE
STATE HIGHWAY
POTENTIAL STATE HIGHWAY
COUNTY ROAD OR CITY STREET
AIRPORT & RAILROAD NOISE CONTOURS
existing conditions
potential conditions
NOTE:
CNEL, CNR AND dB(A) CONTOURS SHOULD NOT BE COMPARED WITH EACH OTHER DUE TO DIFFERENT BASIS OF MEASUREMENT
NOISE GENERATORS WITHIN INCORPORATED AREAS ARE GENERALIZED. ONLY HIGH SCHOOLS, COLLEGES AND CERTAIN INDUSTRIAL AND COMMERCIAL AREAS ARE SHOWN. CONSULT THE APPROPRIATE CITY MAP FOR MORE COMPLETE INFORMATION.
NOISE ELEMENT
of the
RESOURCES PLAN & PROGRAM
prepared by
ventura county planning department


NOISE ELEMENT
of the
RESOURCES PLAN & PROGRAM
INDUSTRIAL SITE
NOISE CONTOURS ~ 65 dB(A)
STATE HIGHWAY
ventura county planning department
october, 1974
MAP OF
THE NORTH HALF OF
VENTURA COUNTY
CALIFORNIA
GENERAL COUNTY MAP
PRIVATE LANDS WITHIN NATIONAL FOREST
KERN
COUNTY

MANAGEMENT RESPONSIBILITIES

NOISE

The responsibility for the control of noise is divided among various levels of government and in turn divided among various agencies and departments at each governmental level. Illustration 7.1 outlines the general responsibilities among levels of governments for noise in general. Illustration 7.2 summarizes the noise control responsibilities of the agencies and departments at each level of government. The remaining tables summarize various State and Federal laws and standards.

Local agencies have several alternatives for the control of various noise generators. These include: enforcement of existing state and local laws, creation of local ordinances and policies, adoption of Federal and State Noise standards, and the implementation of various land use and site planning techniques based on State and Federal planning guidelines.

Illustrations 7.3 to 7.5 summarize the various state laws relative to noise levels of vehicles, boats and aircraft, which local agencies and building departments can immediately enforce. In addition to State laws, local nuisance ordinances relating to disturbing the peace and animal control can be enforced by local law enforcement agencies and the County Department of Animal Control. Nuisance laws ideally supplement noise ordinances by providing controls over community noises which are too sporadic to be included in a noise ordinance.

The second alternative mentioned is the creation of new ordinances. Generally, this includes the passage of some sort of noise ordinance. In contrast to nuisance ordinances, a noise ordinance attempts to provide noise level standards for reoccuring noise generators or land use types. An ordinance should contain a well defined, objective noise standard for various land uses, based on an easy to calculate noise evaluation scheme, maximum noise levels, consideration for impulse sounds, appropriate reference pressure, and reference to a measurement procedure. The Technical Appendix contains two examples of such noise ordinances.

A local ordinance could also extend to the enforcement of Federal and State product standards, to those products once purchased. According to the Noise Control Act of 1972, the United States Environmental Protection Agency must establish noise levels on new products including construction, transportation, electric/electronic equipment and any motor or engine. These product noise levels could be adopted as a part of a noise ordinance by local entities to insure control over specific noise sources which might otherwise be difficult to control. Illustrations 7.6 and 7.7 are State product standards which may apply.

Illustration 7.1
Summary Analysis of Jurisdictional Responsibility in Noise Control

	AIRCRAFT	MOTOR VEHICLE	GENERAL
FEDERAL	- NCA 1972, EPA to propose noise control regulations for aircraft, amends S 611 FAA Act of 1958, asserts that FAA and EPA pre-empt local control (U.S.C. 1973)	- Federal Aid Highways Act, P.O. 91-605 directs Secretary of Transportation to make standards for highway noise control; promulgated in PPM 90-2 of February, 1973. - NCA 1972, regulates noise from surface carriers and motor vehicles engaged in interstate commerce.	- Walsh Healy Act applies noise standards to Fed. contracts. - O.S.H.A. applies noise standards to businesses affecting interstate commerce. - NCA 1972 gives EPA authority to prescribe standards for new products: + construction equipment + transportation equipment + any motor or engine + electric/electronic equipment; also label noise emitting or noise abating equipment. - National Envir. Policy Act allows H.U.D. to approve or disapprove H.U.D. assisted projects on basis of noise; promulgated in circular 1390.2.
STATE (California)	- Subchapter 6. Noise standards, Department of Aeronautics. Regulate noise for all civil aircraft operations to the extent not already limited by federal law.	- Motor Vehicle Code regulates noise limits for new vehicles and all motor vehicle operation. - Cal. Streets and Highways Code S 216 abates noise within schools near freeways (50 dbA Interior) - Harbor and Navigation Code S2:654:05 regulates noise emission from motorboats in or upon inland waters.	- Division of Industrial Safety controls industrial noise. Calif. Administrative Code S5095. - S 415 Penal Code prohibits loud and unusual noise that distrubs the peace. - Envir. Quality Act encourages local agencies to control environmental quality. - Health and Safety Code S.24180-8 establish State office of Noise Control to provide technical assistance to local governments.
LOCAL	- Airport authority as <u>proprietor</u> may impose curfew. (Issue has yet to be resolved in courts.) - Subchapter 6 requires County to determine airports to be monitored and provide quarterly reports. - Public Utilities Code S 21670 requires county for form Airport Land Use Commission to formulate comprehensive land use in airport influence area.	- Local jurisdiction may enact regulations for off-highway motor vehicles, refuse vehicles and sound trucks. - May regulate the use of roads and highways based on noise considerations. - Enforce State Motor Vehicle Regulations.	- Control compatability by land use If not in conflict with State general laws may enact nuisance laws and noise control ordinances to control: + construction noise + amplified sound + fixed noise sources + other noise sources whose control is not pre-empted by State or Federal government. - Chapter 35 of U.B.C. and Chapter 25 of State Housing land allows local building departments to require the use of sound attenuating material for non-single family structures occupancies in particular areas.

Source: Adopted from County of San Diego, April 1974.

Illustration 7.2

Agency Responsibility for Noise

Federal	General Policies	Hwys. Noise Abatement	Aviation Noise Abatement	Airport Noise Control	Occupational Noise Abatement	Constr. Site Noise	Constr. Noise Abatement Acoustical Char. - Bldg.	Building Siting	Manufacture Product Noise Abatement	Land Use Noise Abatement	Complaints	Research
Fed. E.P.A.	x								x			x
Dept. of Defense	x											
Air Force			x		x							
Dept. of Navy					x							
Dept. of Army						x						
Fed. Highway Admin.		x										
Fed. Aviation Admin.			x									x
Dept. of Labor					x	x						
Dept. of Interior					x							
Atomic Energy Com.					x							
Gen. Services Ad.						x	x					
Dept. of Housing & Urban Development							x					x
Dept. of Commerce					x				x			x
Nat'l Institute of Occupational Safety & Health (HEW)					x							x

Illustration 7.2
(cont.)

	General Policies	Hwys. Noise Abatement	Aviation Noise Abatement	Airport Noise Control	Occupational Noise Abatement	Constr. Site Noise	Constr. Noise Abatement Acoustical Char. - Bldg.	Building Siting	Manufacture Product Noise Abatemen	Land Use Noise Abatement	Complaints	Research
<u>State</u>												
State Office of Planning & Research	x											
Dept. of Health	x				x							x
Dept. of Aeronautics			x	x		x						
Dept. of Calif. Highway Patrol		x										
CALTRANS		x										x
State Div. of Industrial Safety					x	x						
Dept. of Human Resources Development							x					
<u>Local</u>												
Councils and Board of Supervisors	x											
Local Planning Depts.								x		x	x	x
Environmental Health					x						x	x
Building & Safety							x	x				
Public Works		x					x	x				
Dept. of Airports & Harbors				x								
Police & Sheriff											x	

Source: Ventura County Environmental Health "Distribution List"

* Public Buildings Only

Local jurisdictions could also adopt Federal and State regulations and guidelines for local development. Four Federal and State regulations which are of particular importance are summarized in illustrations 7.8 to 7.10. This includes federally adopted H.U.D. and Department of Transportation guidelines as well as state regulations concerning school noise and appropriate land uses surrounding airports.

The H.U.D. noise guidelines are used to help determine whether projects applying for H.U.D. or F.H.A. loans are qualified on the basis of noise. The Department of Transportation has established noise standards and procedures (illustration 7.8) to determine if particular roadways can qualify for federally assisted noise abatement projects. State laws also establish standards estimating adverse impacts of noise on various land uses. These standards could be adopted as policy or ordinance by local entities locating the appropriate land uses near noise sources.

The advantage of using these standards, particularly the H.U.D. standards, is that they may have greater acceptability due to greater resources available to State and Federal agencies.

The problem with these standards is that they are inconsistent, individually they do not adequately measure the noise conditions, and they may be too high to accurately reflect community desires. For example, the Department of Transportation standards can be considerably lower than H.U.D. standards interpreted on an L_{10} basis: 80 dB(A) for H.U.D. compared to a maximum of 75 dB(A) for D.O.T. Also, although the D.O.T. standards consider peaks, they do not provide a time history standard in order to consider nighttime impacts or community response. Finally, the noise levels standard of an L_{10} of 70 dB(A) may not be acceptable to the people of Ventura County for residential areas.

Illustration 7.3
Noise Limits For On-Highway Motor Vehicles
State of California

	On Streets with a Grade of 1% or higher		On Streets with a Grade not exceeding 1%
	Speed Limit of 35 mph or less	Speed Limit of more than 35 mph	Speed Limit of 35 mph or less
1) Any motor vehicle with a manufacturer's gross vehicle weight rating of 6,000 pounds or more and any combination of vehicles towed by such motor vehicle:			
a) Before Jan. 1, 1973	88 dB(A)	90dB(A)	
b) On and after Jan. 1, 1973	86 dB(A)	90dB(A)	82 dB(A)
2) Any motorcyle other than a motor-driven cycle	82 dB(A)	86dB(A)	77 dB(A)
3) Any other motor vehicle and any combination of vehicles towed by such motor vehicle	76 dB(A)	82dB(A)	74 dB(A)

SOURCE: Section 23130, 23130.5, California Motor Vehicle Code.

Illustration 7.4

Noise Limits For Motorboats In Or Upon Inland Waters

(a) For engines manufactured on or after January 1, 1974, and before January 1, 1976, a noise level of 86 db(A) measured at a distance of 50 feet from the motorboat.

(b) For engines manufactured on or after January 1, 1976, or before January 1, 1978, a noise level of 84 db(A) measured at a distance of 50 feet from the motorboat.

(c) For engines manufactured on or after January 1, 1978, a noise level of 82 db(A) measured at a distance of 50 feet from the motorboat.

SOURCE: Section 654.05, California Harbor and Navigation Code

Illustration 7.5

Sound Transmission Class (S.T.C.) And
Impact Insulation Class (I.I.C.)
For Non-Single Family Buildings For Human Occupancy

The noise standards below apply to all new buildings intended for human occupancy except detached single family dwellings that are intended to be built within a CNEL 60 dB noise environment. These standards are to be enforced by local building departments.

Interior Noise Levels must not exceed an annual average CNEL of 45 dB and the developer must provide an acoustical study to demonstrate that the structure meets the interior noise level if located within a known or predicted CNEL of 60 dB.

	STC rated/field-tested	IIC rated/field-tested
Floor-Ceiling Assemblies	50/45	50/45
Wall Assemblies	50/45	50/45
Dwelling Unit Entrance Doors From Interior Corridors	30	-----

SOURCES: U.B.C., Chapter 35, and California Administrative Code, Title 25, Article 4, Chapter 1.

Illustration 7.6

Noise Limits For New Off Highway Motor Vehicles
State Of California

(a) *** No Person shall sell or offer for sale a new off-highway motor vehicle subject to identification which produces a maximum noise exceeding the following noise limit at a distance of 50 feet from the center-line of travel under test procedures established by the Department of the California Highway Patrol:

(1) Any such vehicle manufactured on or after January 1, 1972, and before January 1, 1973 .... 92 db(A)

(2) Any such behicle manufactured on or after January 1, 1973, and before January 1, 1975 .... 88 db(A)

(3) Any such vehicle manufactured on or after January 1, 1975 .... 86 db(A)

(b) Test procedures for compliance with this section shall be established by the Department of the California Highway Patrol, taking into consideration the test procedures of the Society of Automotive Engineers.

SOURCE: Section 38280, California Motor Vehicle Code

Illustration 7.7

Noise Limits For New Motor Vehicles
State Of California

(a) No person shall sell or offer for sale a new motor vehicle, except an off-highway motor vehicle subject to identification as defined in Section 38012, which produces a maximum noise exceeding the following noise limit at a distance of 50 feet from the centerline of travel under test procedures established by the department:

(1) Any motorcycle manufactured before 1970 ....92 db(A)

(2) Any motorcycle, other than a motor-driven cycle, manufactured after 1969, and before 1973 ....88 db(A)

(3) Any motorcycle, other than a motor-driven cycle, manufactured after 1972, and before 1975 ....86 db(A)

(4) Any motorcycle, other than a motor-driven cycle, manufactured after 1974, and before 1978 ....80 db(A)

(5) Any motorcycle, other than a motor-driven cycle, manufactured after 1977, and before 1988 ....75 db(A)

(6) Any motorcycle, other than a motor-driven cycle, manufactured after 1987 ...70 db(A)

(7) Any snowmobile manufactured after 1972...82 db(A)

(8) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1967, and before 1973 ....88 db(A)

(9) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1972, and before 1975 ....86 db(A)

(10) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1974, and before 1978 ....83 db(A)

(11) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1977, and before 1988 ....80 db(A)

(12) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1987.........70 db(A)

(13) Any other motor vehicle manufactured after 1967, and before 1973 ....86 db(A)

(14) Any other motor vehicle manufactured after 1972, and before 1975 ....84 db(A)

(15) Any other motor vehicle manufactured after 1974, and before 1978 ....80 db(A)

(16) Any other motor vehicle manufactured after 1977, and before 1988.............75 db(A)

(17) Any other motor vehicle manufactured after 1987 ....70 db(A)

(b) Test procedures for compliance with this section shall be established by the department, taking into consideration the test procedures of the Society of Automotive Engineers.

SOURCE: Section 27160, California Motor Vehicle Code

Illustration 7.8
Department of Transportation Design Noise Standards

Land Use Category	Design Noise Level - L_{10}	Description of Land Use Category
A	60 dB(A)	Tracts of lands in which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces which are dedicated or recognized by appropriate local officials for activities requiring special qualitites of serenity and quiet.
B	70 dB(A) (Exterior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	75 dB(A) (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	--	For requirements on undeveloped lands see paragraphs 5a(5) and (6), this PPM.
E	55 dB(A) (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

SOURCE: Code of Federal Regulations Chapter 1, Title 23, Part 772.

Illustration 7.9
Department of Housing and Urban Development
Noise Standards

	Exterior (New Construction Sites)	Interior (New and Rehabilitated Construction)
Unacceptable	-Exceeds 80 dB(A) 60 minutes per 24 hours	
	-Exceeds 75 dB(A) 8 hours per 24 hours	-STC less than 45
Discretionary-Normally Unacceptable	-Exceeds 65 dB(A) 8 hours per 24 hours	
	-Loud repetitive sounds	
Discretionary-Normally Acceptable	-Not exceed 65 dB(A) more than 8 hours per 24 hours	
Acceptable	-Not exceed 45 dB(A) more than 30 minutes per 24 hours	-Sleeping Quarters -Not exceed 55 dB(A) for more than an accumulation of 60 minutes per any 24 hour period, and -Not exceed 45 dB(A) for more than 30 minutes during night-time sleeping hours from 11 p.m. to 7 a.m. -Not exceed 45 dB(A) for more than an accumulation of eight hours in any 24-hour day

SOURCE: HUD circular 1390.2

Illustration 7.10
State Noise Level Standards for various Land Use

Regulation	Responsible Agency	Directed Towards	Standard	Function
Amendment to Section 216, Streets and Highway Code	CALTRANS	Schools	Interior level 50 dB(A) at existing schools near existing or planned freeways.	Criteria to determine need for acoustical treatment
Subchapter 6, Title 4 of Business Regulations for Cal. Administrative Code	Dept. of Aero	-Agriculture -Airport property -Industrial property -Commercial property -Property subject to an aviation easement for noise -Zoned open space -High rise apartments that provides no greater interior noise levels than CNEL of 45 dB(A)	Exterior level of CNEL of 70 dB(A) until December 31, 1985 and 65 dB(A) thereafter	Land uses which are compatible within the noise impact boundary of a CNEL of 70 dB(A) until December 31, 1985 and 65 dB(A) afterwards.

SOURCES: Chapter 541 of State Statue and Code Amendments and Subchapters 1, Title 4 of the Business Regulations for California Administrative Code

FINDINGS

NOISE

GENERAL FINDINGS

PROBABILITY OF OCCURRENCE: (see General Inventory of Noise)

1. Noise is directly associated with human activity. In Ventura County, noise is primarily a function of traffic, machinery and airports. As traffic and industrialization increase in the County, the potential for higher noise levels increases.

2. From a historical perspective, noise in the County is on the increase, but the rate varies from area to area.

SEVERITY OF THE HAZARD

1. In general, noise may cause psychological, sociological, physiological, auditory, economic and structural primary and secondary impacts. However, at this time, the levels at which these effects may occur has not been sufficiently documented to make concludsions. (see General Effects of Noise)

2. Although community noise levels in the County are not known, nor the intensity at which adverse impacts occur, spot measurements indicate that there is a high probability that noise within the County does create adverse impacts. (see General Effects of Noise and General Inventory of Noise)

3. The significance of these noise impacts may be assessed by social and economic costs; physical costs, the costs of annoyance; human pain and suffering; by evaluating costs involved with the secondary effects of noise; and by the number of people's complaints. (see General Effects of Noise)

RESOURCES EFFECTED

1. Noise may cause adverse impacts to people, wild and farm life, and structures close enough to the noise source.

2. Land uses which may be particularly sensitive to noise due to annoyance or health factors would include:

   Residential Areas (single-family, apartments, hotels, motels)

   Educational and health-related facilities (schools, libraries, hospitals, rest homes, mental care facilities)

   Certain Industrial facilities (research institutions)

   Certain recreational and entertainment facilities (parks for passive activities, concert halls, motion picture theatres, legitimate theatres)

   Churches

3. Land uses which may be less sensitive to noise may include:

   Commercial facilities (e.g., warehousing, general offices, stores)

   Industrial facilities (e.g., light and heavy industry)

   Certain recreational and entertainment facilities (e.g., playgrounds, stadiums, gymnasiums)

NATURE OF THE INFORMATION (see General Inventory of Noise)

1. The data produced on the various transportation facilities are calculated predictors of the noise environment. They do not reflect the actual noise environment of existing facilities nor do they provide enough information for planning purposes for locating future facilities.

2. No noise data has been received from the Southern Pacific Railroad Company.

3. Noise data reported by different agencies should not be compared unless the two measurement schemes are found to be equivalent.

4. No conclusions on historical comparisons can be made about any community due to the insufficient number and short duration of measurements made.

5. Airport noise data which is expressed in the same schemes were not developed by the same methodology.

NOISE SOURCES (see General Inventory of Noise)

1. On a generalized basis, motor vehicles, as a group, are the most pervasive contributors to urban noise, while aircraft and certain high intensity industrial noise generators may produce the most aggravated community annoyance reactions.

2. Other significant noise sources are factories, railroads, powered gardening equipment, stereo sound amplifiers, musical instruments, power tools, and air conditioners.

OTHER SIGNIFICANT FINDINGS

1. Noise is unwanted sound. (see General Description of noise)

2. Noise is measured in a relative, logarithmic way, which may represent sound pressure or sound power levels and is usually expressed in units of decibels. (see General Description of Noise)

3. The human ear does not respond equally to all frequencies of sound, and has no response below 20 hertz or above 20,000 hertz. The ear is most sensitive with frequencies ranging from 1,000 to 8,000 hertz. (see General Description of Noise)

4. The five major classes of community noise are: steady wide band, steady narrow band, impulse, repeated impulse, and intermittent noise. (see General Description of Noise)

5. Two adjacent noise sources which by themselves may not cause a serious impact, may cause an impact due to proximity to each other. This phenomena may be especially significant in urban areas where multiple or "complex" sources exist. Contours within this report do not reflect this potential. (Two source concepts discussed in General Description of Noise)

6. Several factors effect noise radiation: distance, barriers, weather, etc. (see General Description of Noise)

7. There are a variety of measurement evaluation schemes which a jurisdiction can use. These schemes mold measured data into a usable form, which varies depending on the purpose the data is to be used for. The measurement evaluation schemes are categorized as: psychoacoustic, statistical level and time history. (see Noise Evaluation Schemes)

8. The ideal evaluation scheme should differentiate between day and nighttime noise, seasonal changes, and tonal qualities. Measurements should be of sufficient duration to be representative of a 24-hour day. Peak levels should be considered. The scheme should be relatively simple to calculate and the results should be representative of community response. (see Noise Evluation Schemes)

9. Division of responsibility for noise control is divided among Federal, State, and local governments. (see Management of Noise)

10. Federal and State responsibility for noise control is divided among 28 different agencies. (see Management of Noise)

11. Responsibility for responding to noise complaints in Ventura County is shared by the sheriff's office, city police departments, city and county planning departments, County departments of Animal Control, and Environmental Health. (see Management of Noise)

12. The noise problem does not stop at each jurisdiction's boundary, but may continue on to impact resources in other jurisdictions, as evidenced by the four possible regional noise generators of: Ormand Beach and Mandalay Power Generating plants, Rocketdyne test facility, and the drop forge facility on Arcturus Street in Oxnard.

SPECIFIC FINDINGS (See Local Inventory of Noise Sources)

1. Roadways seem to be the most pervasive noise generators in the County. Twenty-one out of thirty-seven schools in the unincorporated areas, ten parks, six health and old age related facilities and residential, and commercial areas are potentially impacted.

2. Due to wide distribution and the machinery noises possibly generated, industrial sources may be a significant noise generator, especially the impacts of four regional noise generating facilities including Mandalay and Ormand Beach Power Generating facilities, Arcturus Drop Forge and Rocketdyne Test Facility in Los Angeles County. Resources impacted may include seven schools, five health and old age related facilities and residential and commercial areas.

3. Airports are regarded as the third greatest noise generator due to the intensiveness of the noise. They appear, though, to have minimal impact on resources in the unincorporated areas of the County. Resources that may be impacted include residential, commercial and industrial facilities and Laguna Vista school.

4. Because noise sensitive land uses located on the sides of hills or mountains are more exposed to noise than are sensitive uses in the valley and because the County has such a hilly, mountainous terrain, planning of hillside development should consider this exaggerated impact of noise.

5. Based on the variety of spot measurements taken, noise levels in the unincorporated areas of the County may be reaching unacceptable levels. It should be noted that this finding would require additional research in order to make specific conclusions.

OPTIONS

NOISE

The options that are found in this section represent a variety of measures or concepts from which formal recommendations could be drawn. They are not intended to be recommendations, but rather a series of alternatives which, individually or collectively could be employed to correct or provide a beginning to alleviate a condition identified in the preceding chapter - FINDINGS.

The variety of options is designed to be a pool from which final recommendations can be drawn and proposed by the appropriate staffs to their respective planning commissions, city councils, or Board of Supervisors. It is suggested that in adopting various options, an entity is establishing a policy orientation which could be pursued and result in formally worded policy or ordinance. In this sense, an entity's adoption of various options would be taken as a mandate to more fully develop the ideas and concepts embodied in the various options. This means before the adoption of any options, an entity should closely coordinate with other entities and special interests who may be impacted by the options in order to obtain a full evaluation of any commitment.

Following this portion of the report are various recommendations on the control of noise made by agencies and concerned organizations. These recommendations emphasize their preferences on the options or a variation on the options outlined in this portion of the report. An entity may draw upon these recommendations to assist it in determining the appropriate control measures to develop and adopt.

1. The County and the nine cities, if feasible, should budget time and money and join together in forming a countywide technical committee composed of persons knowledgeable in the field of noise, persons who must deal with the noise problem and persons who reflect or represent each community's desires. This committee may be responsible for:

   a. The creation of a standardized methodology for the acquisition and processing of noise data to be used in possible noise studies and ordinances;

   b. The establishment of guidelines for predicting future noise generators;

c. The establishment of countywide noise standards which reflect the entire community's desires while considering health impacts;

d. The creation of a countywide noise ordinance to enforce adopted noise standards;

e. The execution of a countywide noise study to determine specific noise impacts;

f. Investigation of noise control techniques that can be used to reduce present and future noise impacts;

g. The following steps may be followed by the committee in order to implement this option:

STEP I: Creation of standardized methodology for measurement of existing and potential noise sources.

STEP II: Investigation of noise control techniques that can be used to reduce future noise impact including creation of a noise control provision in the zoning ordinance.

STEP III: Creation of a noise ordinance with noise level standards.

STEP IV: Inventory of existing noise situations.

STEP V: Investigation and creation of programs to reduce present noise conflicts.

2. A community may wish to take certain remedial steps in the interim while formal standards and an ordinance are being developed. These steps may include:

a. The adoption of the United States Department of Housing and Urban Development's noise standards and interpretive guidelines as interim standards or guidelines (See Illustration 7.9);

b. The adoption of Federal and State laws and standards relating to noise emission levels of motor vehicles, motorcycles, power boats, aircraft, and various other products, as interim standards or guidelines;

c. The adoption of a general policy controlling noise at the source, along the path of the noise and at the recipient. This policy might suggest further investigation into the possibility of using a variety of strategies to control noise including the following:

1. Source Control

   A. If it is determined feasible, remove all noise sources.

      a. Amortize all noise generators affecting noise sensitive areas.

      b. Encourage the movement of noise generators out of an area by tax incentives.

      c. Evict noise sources that create conflicts after a specified period.

   B. Modification of Equipment

      a. Equipment must not generate any more than ___dB in any octave band measured at ___ feet from the property line or the recipient.

      b. Require only acoustically treated equipment be used in urban areas.

      c. Public entities purchase only acoustically treated equipment.

      d. Public entities acoustically treat existing equipment.

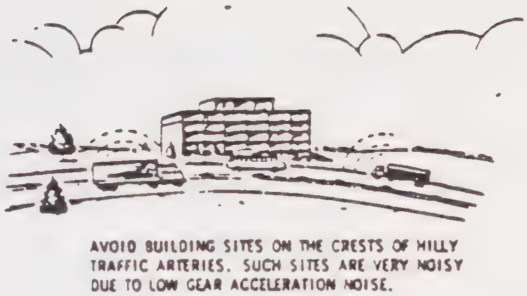
   C. Control hours of Operation

      a. No noise generating facility which is located within ___ feet or ___ decibel contour of a noise sensitive area should operate between 7:00 p.m. and 7:00 a.m.

      b. Schedule noisy operation at facilities to given time per month in order to minimize impact.

   D. Control Number of Operations

Building Sites near Traffic Junctions.



Building Sites near Hilly Traffic Areas.

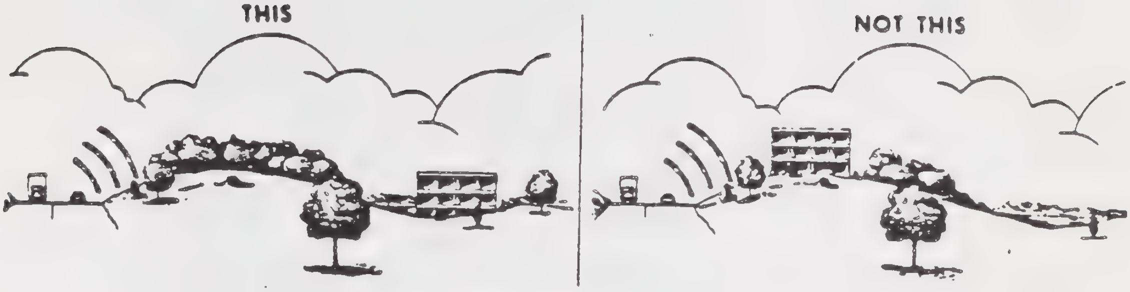
Use of Various Noise Barriers.

Use of Buildings as Noise Barriers.

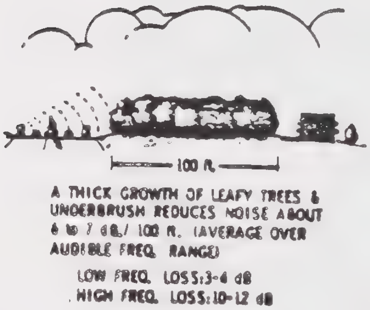
Selection of Building Sites Relative to Wind Direction.

ILLUSTRATION 9.1
Site Selection Criteria for
Noise Mitigation

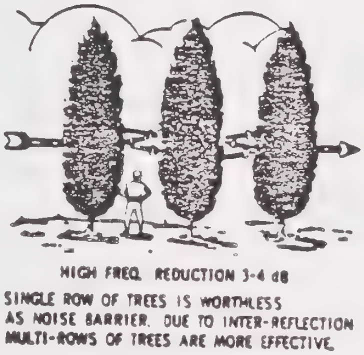
Source: BERENDT, 1967, pp. 5-1 and 5-2



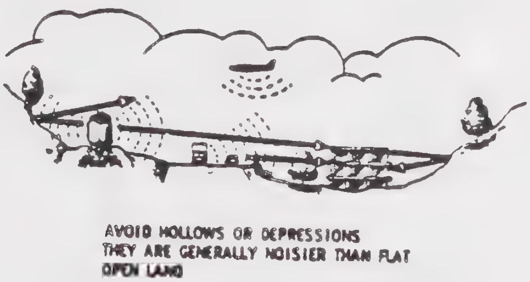
Use of Natural Noise Barriers.



Effectiveness of Wooded Areas as Noise Barriers.



Noise Reduction of Trees.



An Example of a Poor Building Site.

Building Sites near Traffic Arteries and other Buildings.

ILLUSTRATION 9.1

POOR BETTER

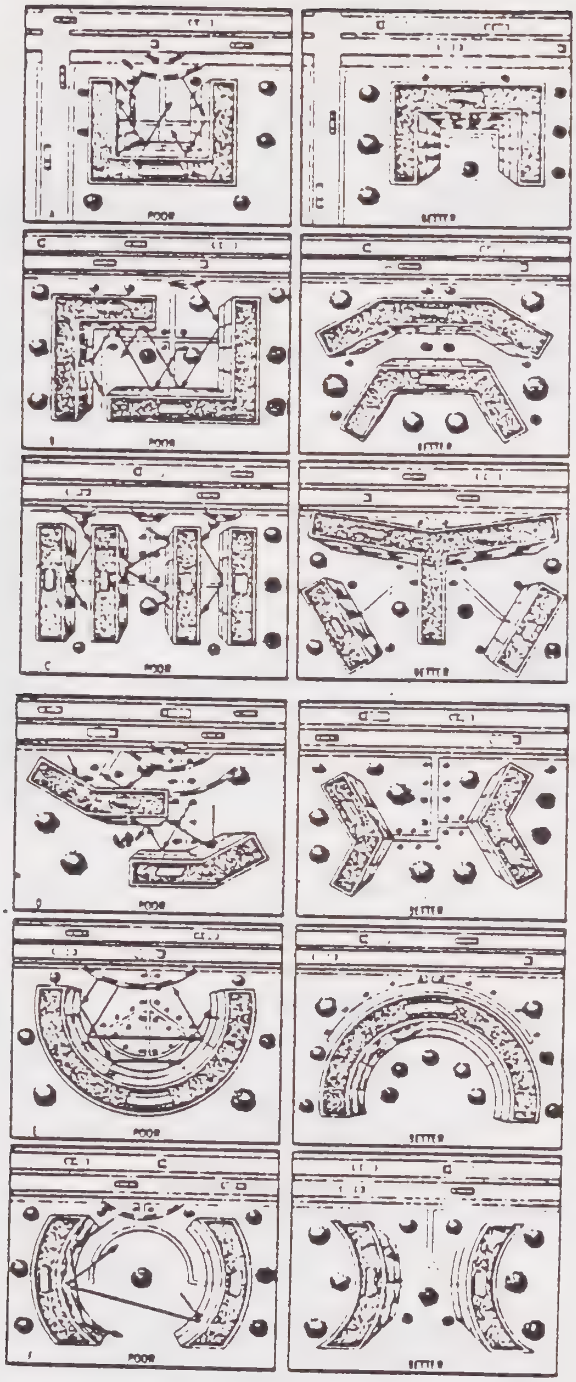


ILLUSTRATION 9.2

Building Orientation on Site
for Noise Mitigation

Source: BERENDT, 1967, pg. 5-4

a. If feasible, facilities should be designed to carry no more than ____ vehicles per hour at ____ mph in noise sensitive areas.

b. Roads or railroad lines should not be allowed to obtain speeds greater than ____ mph within _____ feet of noise sensitive areas.

c. No more than ____ trucks per eight hours may operate on a given road.

d. No more than ____ flights per eight hours may operate at a given facility.

e. No more than ____ flights may operate at a given facility between the hours of 7:00 p.m. and 7:00 a.m.

f. Single-point sources might be limited in the number of times a noisy machine could be used, if feasible.

E. Modification of Operations

a. Only aircraft of less than ____ peak dB(A) shall land between the hours of 7:00 p.m. and 7:00 a.m.

b. If possible and as it relates to safety, signalization of streets and highways should be designed to minimize stop-and-go traffic.

c. Locate noise generating equipment at furthest point from property line.

d. Glide slopes at airports should be greater than ____ degrees.

e. Where alternative routes are available, no trucks over ____ lbs. gross weight shall operate on roads in noise sensitive areas, except selected service vehicles.

f. Designated truck routes should be created which minimize the impact on sensitive areas.

2. Path Control

A. Use of Barriers

a. Any stationary source which generates more than ____ decibels over eight hours shall be required to provide a barrier.

b. Any stationary source which potentially generates more than ____ decibels shall be designed to be enclosed all year round.

c. Barriers shall be required to be built around potential noise sources or noise sensitive areas if prescribed noise levels are exceeded.

d. Barriers shall be required when a roadway is within ____ feet of a noise sensitive area.

e. All construction activities must use temporary barriers.

B. Criteria for Design of Barriers

a. Barriers should be located only after specific studies of the noise problem have been made.

b. If feasible, barriers should be as acoustically high as the noise generator or noise sensitive area.

C. Modification of Reverberation Characteristics of an Area

a. If feasible, buildings located on noisy arterials should have acoustical material on outside walls.

b. Buildings over ____ feet high should be set in ____ feet for every ____ feet in height, if located on a noisy arterial.

3. Recipient Control

A. Site Design

a. Parking lots should be oriented toward noisy arterials.

b. Buildings should be situated so as not to reflect noise into other buildings.

c. Buildings should be situated so as to take advantage of any natural barriers.

d. Buildings should be oriented such that one building acts as a barrier for other buildings on that site.

e. No new land use should be acoustically higher than noise barrier provided.

B. Remove Recipients (see noise source removal)

4. Locational Control

A. Transportation

a. No new road should have on-grade railroad crossing within ______ foot distance of a noise sensitive area.

b. No land uses which attract traffic should encourage traffic to travel through noise sensitive areas.

c. Traffic generators should be grouped into confined areas.

d. Traffic generators, such as parking lots, at noise sensitive uses (hospitals, high schools, multi-family) should be located at the edge of noise sensitive areas.

B. Land Use

a. Whenever possible, one or more of the following types of uses could be located as a barrier between noise sensitive uses and noise generating areas:

1) Multi-family
2) Office buildings
3) Commercial buildings
4) Industrial (quiet)
5) Parks
6) Agriculture
7) Open Space (other than parks or agriculture)

b. No new noise sensitive land use should be located within ____ foot distance of ____ dB noise level of any noise generators.

c. No new noise source should be located within ____ foot distance or ____ dB noise level of any noise sensitive use.

d. If feasible, group noise generators into acoustical areas isolated by hills, tall buildings, etc.

e. Group noise generators into noise districts.

f. No new noise sensitive use should locate within an acoustically confined area which already has a noise generator.

g. No noise sensitive use should locate between a traffic generator and their transportation facility.

h. Avoid locating noise sensitive uses within ____ feet of highway or railway grades.

i. Avoid locating noise sensitive uses within _____ feet of junctions of main arterials.

j. Whenever feasible, create urban open space at major arterial junctions.

k. Whenever feasible, create open space along grades of transportation facilities.

l. Whenever feasible, use malls for noise sensitive downtown streets.

m. Whenever feasible, purchase noise easements.

3. Rather than forming a countywide task force, each entity may independently want to establish and adopt:

A. Methodology for the acquisition and processing of noise data (See Technical Appendix A for examples).

B. Establish guidelines for procedure of predicting future noise generators (See Technical Appendix B for examples).

C. Standards which reflects the established methodology (See Technical Appendix C for examples).

D. A noise ordinance (See Technical Appendix D for examples).

E. A noise study (See "Community Noise Study" by the City of Inglewood).

F. Investigation of noise control techniques that can be used to reduce present and future noise impacts.

G. The entity may wish to follow the steps outlined below in the implementation of this specific option:

STEP I: Creation of Standardized Methodology for measurement of existing and potential noise sources.

STEP II: Investigation of noise control techniques that can be used to reduce future noise impact including creation of a noise control provision in the zoning ordinance.

STEP III: Creation of a noise ordinance.

STEP IV: Inventory of existing noise situation.

STEP V: Investigation and creation of programs to reduce present noise conflicts.

The above measures may be developed through a city-wide citizens committee with staff support, the hiring of an acoustical consultant, or obtaining the services of the Ventura County Environmental Health Department.

4. An entity may want to require a noise sub-report as a part of a project's EIR or case review. This report might be required for all projects proposed for areas within the designated contours or within 1,000 feet of spot sources. Such a report should be based on the data that was gathered using a consistent measuring methodology. The report should contain projected noise levels for the noise generating uses on the site as well as existing noise levels at the site.

5. An entity may wish to obtain more precise noise data on the Southern Pacific Yard operations. This could be obtained by staff calculating the data or by requesting compliance by Southern Pacific Transportation Company to Government Code 65302(g).

6. Since many laws now exist relative to noise, increasing staff or re-assigning priorities to enforce these laws might be done rather than creating new laws. Among the departments which might be given additional staff or new priorities are: (See Illustrations 7.3 to 7.8)

Law Enforcement agencies to enforce nuisance laws.

Animal Control Department to enforce animal related nuisance laws.

Planning Department to enforce zoning violations.

Building Department to enforce Uniform Building Code and State Administrative Code.

Environmental Health Department to enforce occupational noise laws.

A noise control agency or program could be created which would involve all of the above departments in one coordinated effort.

RECOMMENDATION ON OPTIONS

NOISE

The following are a collection of recommendations from various sources which are intended to guide decision makers in the selection of specific responses to conditions within their jurisdiction.

The following are recommendations adopted by the Ventura County Association of Governments' General Plan Elements Policy Advisory Committee, 1974.

OBJECTIVE:

The Community emphasis in the reduction of noise problems should be directed towards the control of new/future, undesireable noises and abatement of existing undesirable noises, including:

..Control of the noise source
..Provision of buffer areas between the noise source and the recipient
..Protection of the noise recipient
..The control of land uses through planning, building codes, and ordinances
..Any other areas in which reduction or elimination of undesirable noise can be achieved

STANDARDS:

Because various standards for measuring noise levels have been established by public agencies, and because there are a number of reports of health effects of noise which have been referenced in the Noise Element, each community should review these standards and reports, determine their applicability to the community and the ability of the community to effectively utilize the standards. Standards should be established on a uniformly consistent basis throughout the county for:

..Noise measurement procedures
..Maximum noise levels, from exterior sources, for the interior of specific type of structures for living and occupancy
..Noise monitoring program
..Noise related building codes
..Acceptable noise levels

CONTROLS:

Communities are encouraged to adopt, on a consistent countywide basis, a series of controls on noise, including:

<u>Stationary Source Controls</u>
..Control of type of equipment, structures, time of operations, and number of operations

..Control of site location and noise sources
..Control of nuisance type noise sources

Mobile Source Controls
..Control of type of equipment, structures, time of operations, and number of operations
..Control of traffic generated noise by limiting traffic volume, speed and vehicle mix
..Enforcement of noise control equipment requirements
..Design and location of new transportation facilities

Recipient Protection
..Control of noise paths by natural and man-made barriers
..Control of interior noise levels, from exterior sources, through building performance standards
..Control of land uses through zoning, site planning and the general plan development
..Control through transportation planning, including route selection, mode selection, traffic control and control of operations

IMPLEMENTATION:

Each community is encouraged to implement the Noise Element of the General Plan on a uniformly consistent countywide basis, including:

..Adoption of a time schedule and appropriate budgeting for implementing the basic recommendations of the Noise Element of the General Plan
..Participation in an ongoing countywide noise monitoring and control program, including the development of measurement standards
..Adoption of acceptable noise level standards associated with each major land use classification
..Adoption of noise control related building codes
..Adoption of noise control enforcement ordinances
..Adoption of procedures for processing violations or complaints

ADOPTED BY THE GENERAL PLAN
ELEMENTS POLICY ADVISORY
COMMITTEE 6/12/74

The following are recommendations adopted by the City-County Planning Association, 1974.

Objective: The community emphasis in the reduction of noise problems should be directed towards the control of

new/future, undesirable noises and abatement of existing detrimental noises, including:

1. Control of the noise source
2. Provision of buffer areas between the noise source and the recipient
3. Protection of the noise recipient
4. The control of land uses through planning, building codes and ordinances
5. Any other areas in which reduction or elimination of undesirable noise can be achieved

Standards: Because various standards for measuring noise levels have been established by public agencies, and because there are a number of reports of health effects of noise which have been referenced in the Noise Element, each community should review these standards and reports, determine their applicability to the community and the ability of the community to effectively utilize the standards. Standards should be established on a uniformly consistent basis throughout the county for:

1. Noise measurement procedures
2. Maximum noise levels for the interior of specific types of structures for living and occupancy
3. Noise monitoring program
4. Noise related building codes
5. Acceptable noise levels

Controls: Communities are encouraged to adopt, on a consistent countywide basis, a series of controls on noise, including:

Stationary Source Controls
1. Control of type of equipment, time of operations and number of operations
2. Control of site location of noise sources
3. Control of nuisance type noise sources

Mobile Source Controls
1. Control of traffic generated noise by limiting traffic volume, speed and vehicle mix
2. Enforcement of noise control equipment requirements
3. Design and location of new transportation facilities

Recipient Protection
1. Control of noise paths by natural and man-made barriers
2. Control of interior noise levels through building performance standards
3. Control of land uses through zoning, site planning and the general plan development
4. Control through transportation planning, including route selection, mode selection, traffic control, and control of operations

Implementation: Each community is encourage to implement the Noise Element of the General Plan on a uniformly consistent countywide basis, including:

1. Adoption of a time schedule for implementing the basic recommendations of the Noise Element of the General Plan
2. Development and participation in an ongoing countywide noise monitoring program
3. Adoption of acceptable noise level standards associated with each major land use classification
4. Adopt a noise control related building code
5. Adopt noise control enforcement ordinances

ADOPTED BY THE CITY-COUNTY PLANNING ASSOCIATION 6/20/74

The following is from:

"Quiet Cities Report" League of Cities 1970

SPECIFIC RECOMMENDATIONS TO CITIES TO AID IN SOLVING COMMUNITY NOISE PROBLEMS:

1. Each city council should adopt a policy statement for reducing noise in the community as part of a broad approach to environmental quality control.

2. Each city should develop a master plan of noise impact which is part of each element of the city master plan.

3. Cities should adopt a noise ordinance to prohibit unwanted and unnecessary sounds of all types within the community.

4. Cities should review their existing ordinances which relate to noise control for compatibility with the above.

5. Cities should undertake a study of excessive noise sources in the community.

6. Cities should develop a noise enforcement and regulation program and consider assigning an existing staff member or creating an administrative position within the city to be concerned with noise problems. Such a staff person could be in the Planning Department, Building Department, Police Department, Administrative Officer or Environmental Control Division.

7. Cities should review their own functions and activities to make sure that noise, such as construction, refuse collection, and street sweeping has been reduced to the lowest possible level.

8. Cities should enforce the motor vehicle code as it applies to excessive noise.

9. Cities should conduct an educational campaign consisting of civic group presentations, news releases, studies and reports to inform citizens of the dangers of noise and the actions each person can take to help reduce noise pollution.

10. Cities should incorporate noise standards in zoning ordinances which will prohibit incompatible land uses with respect to noise.

11. Cities should consider the development of "quiet zones" in special areas of the city, perhaps in already existing recreation areas. All forms of noise would be controlled so that people could visit and enjoy solitude as part of their recreation and leisure experience.

12. Cities should include maximum noise level requirements in specifications for equipment purchases, construction contracts, and refuse collection. Where specific noise levels cannot be set, specifications should require that vendors state maximum noise levels expected to be produced by their equipment and/or operations.

13. Cities should review and re-evaluate their traffic flow systems to synchronize signalization to avoid traffic stops which produce excessive noise, and to adjust traffic flow to achieve noise levels acceptable to surrounding areas.

14. Cities should seek to develop regional planning agreements for zoning and soundproofing to reduce noise incompatibilities across city boundaries.

15. Cities should review county and regional comprehensive plans to identify noise environmental impact and develop alternatives for the control of major noise sources. In any single function county or regional plan such as transportation, airport development, highway development, etc., the same provisions should apply.

16. Cities should contract state and federal officials to convey their concern over noise problems and encourage residents to do the same. Many aspects of noise pollution require state or federal action and governmental officials at all levels should be aware of public need for a solution to noise problems.

The following is from:

"A report to the 1971 Legislature on the Subject of Noise Pursuant to Assembly Concurrent Resolution 165, 1970".

Prepared by the Advisory Committee on Noise for the Human Relations Agency, State Department of Public Health.

RECOMMENDATION

Enact legislation requiring that schools and residences be excluded from land bordering freeways for a distance of 500 feet or that they be protected from freeway noise by equivalent barriers or equivalent freeway design techniques.

RECOMMENDATION

A. Enact legislation to the end that all state agencies require noise control in equipment purchased for state use and that they require noise control in all stages of planning and construction of projects financed by state funds.

B. Encourage local governments to adopt similar regulations.

C. Through appropriate agencies, identify and implement means, including demonstration projects, to accelerate the application of existing noise control technology to all sources of noise in California.

The following is from:

"Oxnard-2000 General Plan: Noise Element, Phase 1, Criteria and Background". Prepared by the Oxnard Planning Department.

NOISE STANDARDS

(1) City Noise Standards. Establish an immediate city-wide noise standard of a mean (L_{50}) of 75dB(A) for the outdoor environment, as measured at the property line or boundary of the public right of way. Prohibit any noise which disturbs the peace or quiet of any neighborhood or disturbs or annoys a reasonable person of normal sensitiveness.

(2) Model Noise Ordinance. Study and consider feasibility of adoption of the League of California Cities' Model Noise Ordinance, or similar nuisance noise ordinance.

(3) Goals and Objectives. Establish concept of noise goals and objectives for each zone and community in the City. Include the concept that noise levels will decrease in incremental stages to achieve an ultimate "quiet city".

(4) City Activities. Require inclusion of noise impact in evaluating all City activities. Initiate feasibility analysis of requiring City noise standards in purchase, rental or lease of equipment, including, but not limited to, office equipment, air conditioning, buses, trucks, automobiles, park and street tree maintenance. Initiate feasibility analysis of requiring noise specifications in new construction, such as public works and civic center expansion.

Monitoring and Measurement

(5) Equipment. Investigate costs of noise measurement equipment to create an ongoing Community Noise Management Program.

(6) Specialist Personnel. Consider establishment of a trained specialist or unit to conduct a Community Noise Survey and then to monitor, test, license and enforce City noise regulations. Such a unit could eventually report to an Environmental Affairs Director who would be concerned with all manifestations of pollution, resource conservation, and the like. Such a specialist unit may serve parttime to meet Building Department needs for enforcing new Sound Transmission Control provisions of the Uniform Building Code.

(7) Noise Information. Establish an ongoing file of noise complaints, attitudes and noise generation. Integrate this with a cumulative environmental impact assessment process.

(8) Noise Surveys. Evaluate existing noise surveys relevant to Oxnard, such as the work of L. C. MaGahan. Initiate feasibility study of new noise surveys. Coordinate with noise contours of transportation elements.

Transportation

(9) Truck Routes. Investigate concept of truck routes to mitigate noise effects on residential areas.

(10) Regional Planning. Consider noise implications in inputs to 1975 Ventura County Multi-Modal Transportation Plan. Support choice of transportation modes which are most efficient from the standpoint of noise generation.

(11) Noise Contours. Develop noise contours and projections for arterials within Oxnard's jurisdiction to supplement those provided by the Division of Highways for State routes. Provide supplementary information as examples on typical noise generation for collector and local streets.

Environmental Health

(12) Environmental Health Coordination. Investigate implications of noise as a public environmental health problem in cooperation with other governmental agencies.

Public Safety

(13) Motor Vehicle Code. Evaluate feasibility of local enforcement of Sections 27150 and 27151 of the Motor Vehicle Code.

(14) Coordination. Integrate police functions with a Community Noise Management Program. Solicit Police Department opinion regarding enforcement of nuisance provisions such as found in the League of California Cities' *Model Noise Ordinance*.

Building Codes

(15) Noise Impact Areas. Analyze feasibility of selectively more stringent building insulation in high noise impact areas as affected by freeways, railroads, and airports. Determine amounts of insulation or other materials required.

(16) Stringent Sound Deadening. Examine need for more stringent sound deadening than required by Uniform Building Code provisions, both for internal and external noise. Consider imposition on existing and new development. Evaluate gradually more stringent standards at 5 or 10 year increments.

General Administration

(17) Program Management. Assign responsibility for inventory of noise problems and solutions to an appropriate authority. This may be an existing individual or committee, or may be an *ad hoc* citizen or staff committee. Progress reports on implementing this report will be received to provide the basis for further recommendations on noise pollution control.

(18) Advocacy. Make recommendations to County, State and Federal Governments on noise legislation and financial assistance. Represent citizens where and when they are or will be potentially exposed to adverse sound.

Housing

(19) HUD Criteria. Recognize HUD standards on noise and evaluate all studies and projects in accordance with Circular 1390.2, *Noise Assessment Guidelines, Guide to ... Structure Borne Noise*, and other HUD material.

Planning Department Implementation

Introduction

In addition to the above items extending throughout the City administration, the following items are the specific responsibility of the Planning Department.

Noise Element

(1) Noise Contours. Request, inspect and revise noise contour information for major transportation elements submitted under State law.

(2) Research. Continue to develop inventory of resources on noise.

(3) Refinement. Refine information and criteria in accordance with finalized State Guidelines on the Noise Element.

(4) Land Use Survey. Survey, list, and map those uses signaled out as especially susceptible to adverse noise impact.

Current Planning

(5) EIR's. Include noise impact and noise generation in all Environmental Impact Reports. Accumulate impacts in an information system to assess composite effect on the noise environment.

(6) Planned Development. Encourage use of sound urban design concepts and optimum noise mitigation in staff analysis and approval conditions of Planned Development Permits.

(7) Zoning. Consider noise impact in all other zoning matters as relevant.

Planning Commission

(8) Model Noise Ordinance. Submit League of California Cities' Model Noise Ordinance for Planning Commission study and recommendation to the City Council on need for nuisance noise control.

RECOMMENDATIONS

NOISE

RECOMMENDATIONS

It is recommended that:

1. The Board of Supervisors appoint the County Environmental Resource Agency as the lead agency in dealing with the problem of noise for Ventura County.

2. The Board of Supervisors, during the 75-76 budgetary process, consider the priority of pursuing a noise reduction program. If a program is pursued, sufficient manpower would be allocated to participate in the establishment, through the Environmental Resource Agency, of an ad-hoc Countywide Technical Committee. This committee may consider, among other things, the following:

    a) The development of interim noise standards and other measures for adoption;
    b) The creation of a standardized methodology for the acquisition and processing of noise data to be used in possible noise studies and ordinances;
    c) The establishment of guidelines for predicting future noise generators;
    d) Review the conformance of existing ordinances and procedures (e.g., zoning, subdivision, etc.) to the Noise Element and present recommended modifications to the appropriate jurisdiction's governing body.
    e) The establishment of countywide noise standards which reflect the various communities' desires while considering health and economic impacts and technological feasibility;
    f) The creation of a uniform countywide noise ordinance to enforce noise standards adopted by the various jurisdictions in the county.
    g) Create a procedure for determining when an acoustical study and noise sub-report is needed for evaluating noise sources and sites for noise sensitive uses.

3. The Board of Supervisors pass a resolution inviting each of the nine incorporated entities to participate on the countywide committee and request that each entity make the appropriate commitment during fiscal 75-76, in order to provide sufficient manpower and/or support.

APPENDIX

NOISE

DESCRIPTION OF HUD GUIDELINES

The HUD guidelines are a series of non-noise metering techniques to evaluate the noise levels of a particular site. Included are techniques to obtain information on aircraft, roadways, and railway noises as well as a walkaway test to evaluate actual on-site noises. The information obtained through these tests are then related to the HUD standards given in Illustration 7.9, in order to evaluate the noise levels at a particular site.

GLOSSARY

A-WEIGHTED SOUND LEVEL (dBA) - A quantity, in decibels, read from a standard sound-level meter that is switched to the weighting network labeled "A". The A-weighting network discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear at moderate sound levels. The A-weighted sound level measures approximately the relative "noisiness" of "annoyance" of many common sounds.

ACOUSTICAL POWER - See sound power.

ACOUSTICS - (1) The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible. (2) The acoustics of an auditorium or of a room, the totality of those physical qualities (such as size, shape, amount of sound absorption, and amount of noise) which determine the audibility and perception of speech and music.

AIRBORNE SOUND - Sound that reaches the point of interest by propagation through air.

AMBIENT NOISE - See background noise.

ANALYSIS - The analysis of a noise generally refers to the composition of the noise into various frequency bands, such as octaves, third-octaves, etc.

ARTICULATION INDEX (AI) - A numerically calculated measure of the intelligibility of transmitted or processed speech. It takes into account the limitations of the transmission path and the background noise. The articulation index can range in magnitude between 0 and 1.0. If the AI is less than 0.1, speech intelligibility is generally low. If it is above 0.6, speech intelligibility is generally high.

ASDS - A new rating scheme is being created for the FAA by the MITRE Corporation called Aircraft Sound Description System. Instead of expressing the level of noise, it tells how many minutes an area is exposed to 85 dB(A) sound or greater.

AUDIBLE RANGE (OF FREQUENCY) (AUDIO-FREQUENCY RANGE) - The frequency range 16 H_z to 20,000 H_z (20 kH_z). Note: This is conventionally taken to be the normal frequency range of human hearing.

BACKGROUND NOISE - The total of all noise in a system or situation, independent of the presence of the desired signal.

BAND CENTER FREQUENCY - The designated mean frequency of a band of noise or other signal. For example, 1,000 hz is the band center frequency for the octave band that extends from 707 hz to 1,414 Hz, or for the third-octave band that extends from 891 Hz to 1,123 Hz.

BAND PRESSURE (OR POWER) LEVEL - The pressure (or power) level for the sound contained within a specified frequency band. The band may be specified either by its lower and upper cut-off frequencies, or by its geometric center frequency. The width of the band is often indicated by a prefatory modifier; e.g., octave band, third-octave band, 10-Hz band.

BROAD-BAND NOISE - Noise whose energy is distributed over a broad range of frequency (generally speaking, more than one octave).

C-WEIGHTED SOUND LEVEL (dBC) - A quantity, in decibels, read from a standard sound-level meter that is switched to the weighting network labeled "C". The C-weighting network weights the frequencies between 70 Hz and 4,000 Hz uniformly, but below and above these limits frequencies are slightly discriminated against. Generally, C-weighted measurements are essentially the same as overall sound-pressure levels, which require no discrimination at any frequency.

COMMUNITY NOISE EQUIVALENT LEVEL - Community Noise Equivalent Level (CNEL) is a cumulative measure of community noise. It uses the A-weighted sound level and applies weighting factors which place greater importance upon noise events occurring during the evening hours (7:00 p.m. to 10:00 p.m.) and even greater importance upon noise events at night (10:00 p.m. to 6:00 a.m.).

COMPOSITE NOISE RATING - Composite noise rating (CNR) is anoise exposure used for evaluating land use around airports. It is in wide use by the Department of Defense in predicting noise environments around military airfields..

CONTINUOUS NOISE - On-going noise whose intensity remains at a measurable level (which may vary) without interruption over an indefinite period or a specified period of time.

DAMPING - The dissipation of energy with time or distance. The term is generally applied to the attenuation of sound in a structure owing to the internal sound-dissipative properties of the structure or owing to the addition of sound-dissipative materials.

DECIBEL - The unit in which the levels of various acoustical quantities are expressed. Typical quantities so expressed are sound pressure level, noise level, and sound power level.

<u>DIFFUSE SOUND FIELD</u> - The presence of many reflected waves (echoes) in a room (or auditorium) having a very small amount of sound absorption, arising from repeated reflections of sound in various directions.

<u>DURATION</u> - The length of time a sound is present.

<u>EFFECTIVE PERCEIVED NOISE LEVEL (EPNL)</u> - A physical measure designed to estimate the effective "noisiness" of a single noise event, usually an aircraft flyover; it is derived from instantaneous PNL values by applying corrections for pure tones and for the duration of the noise.

<u>ENERGY EQUIVALENT NOISE LEVEL</u> - The energy equivalent noise level for a stated period is the level of a constant, or steady state, noise which has an amount of acoustic energy equivalent to that contained in the measured noise. The symbol for the energy equivalent noise level is Leq.

<u>ENVIRONMENTAL NOISE</u> - By Sec. 3(11) of the Noise Control Act of 1972, the term "environmental noise" means the intensity, duration, and character of sounds from all sources.

<u>EQUIVALENT SOUND LEVEL</u> - The level of a constant sound which, in a given situation and time period, has the same sound energy as does a time-varying sound. Technically, equivalent sound level is the level of the time-weighted, mean square, A-weighted sound pressure. The time interval over which the measurement is taken should always be specified.

<u>FARFIELD</u> - Consider any sound source in free space. At a sufficient distance from the source, the sound pressure level obeys the inverse-square law, and the sound particle velocity as in phase with the sound pressure. This region is called the far field of the sound source. Regions closer to the source, where these two conditions do not hold, constitute the near field. Now consider a sound source within an enclosure. It is also sometimes possible to satisfy the far-field conditions over a limited region between the near field and the reverberant field, if the absorption within the enclosure is not too small so that the near field and the reverberant field merge.

<u>FILTER</u> - A device that transmits certain frequency components of the signal (sound or electrical) incident upon it, and rejects other frequency components of the incident signal.

<u>FREE SOUND FIELD (FREE FIELD)</u> - A sound field in which the effects of obstacles or boundaries on sound propagated in that field are negligible.

FREQUENCY - The number of oscillations per second (a) of a sine-wave of sound, and (b) of a vibrating solid object; now expressed in hertz (abbreviation Hz), formerly in cycles per second (abbreviation cps).

HEARING LEVEL - The difference in sound pressure level between the threshold sound for a person (or the median value or the average for a group) and the reference sound pressure level defining the ASA standard audiometric threshold (ASA: 1951). Note: The term is now commonly used to mean hearing threshold level (qv). Units: decibels.

HEARING LOSS - At a specified frequency, an amount, in decibels, by which the threshold of audibility for that ear exceeds a certain specified audiometric threshold, that is to say, the amount by which a person's hearing is worse than some selected norm. The norm may be the threshold established at some earlier time for that ear, or the average threshold for some large population, or the threshold selected by some standards body for audiometric measurements.

HEARING LOSS FOR SPEECH - The difference in decibels between the speech levels at which the "average normal" ear and a defective ear, respectively, reach the same intelligibility, often arbitrarily set at 50%.

HEARING THRESHOLD LEVEL - The amount by which the threshold of hearing for an ear (or the average for a group) exceeds the standard audiometric reference zero (ISO, 1964; ANSI, 1969). Units: decibels.

HERTZ - See frequency.

IMPACT INSULATION CLASS (IIC) - A single-figure rating which is intended to permit the comparison of the impact sound insulating merits of floor-ceiling assemblies in terms of a reference contour.

IMPULSE NOISE (IMPULSIVE NOISE) - Noise of short duration (typically, less than one second) especially of high intensity, abrupt onset and rapid decay, and often rapidly changing spectral composition. Note: Impulse noise is characteristically associated with such sources as explosions, impacts, the discharge of firearms, the passage of super-sonic aircraft (sonic boom) and many industrial processes.

INDIVIDUAL SENSITIVITY - The degree of perceptiveness an individual may have to noise. The perceptiveness may vary between individuals due to differences in noise exposure, temperament, physical differences, etc.

INFORMATIONAL CONTENT - Sound which contain semantic cues.

INFRASONIC - Having a frequency below the audible range for man (customarily deemed to cut off at 16 Hz).

INTERMITTENT NOISE - Fluctuating noise whose level falls once or more times to low or unmeasurable values during an exposure.

INVERSE-SQUARE LAW - The inverse-square law described that acoustic situation where the mean-square sound pressure changes in inverse proportion to the square of the distance from the source. Under this condition the sound-pressure level decreases 6 decibels with each doubling of distance from the source.

L_{10} LEVEL - The sound level exceeded 10 percent of the time period during which measurement was made.

L_{50} LEVEL - The sound level exceeded 50 percent of the time period during which measurement was made.

L_{90} LEVEL - The sound level exceeded 90 percent of the time period during which measurement was made.

LEVEL - The level of an acoustical quantity (e.g., sound pressure), in decibels, is 10 times the logarithm (base 10) of the ratio of the quantity to a reference quantity of the same physical kind.

LOUDNESS - (1) A listener's perception of the intensity of a strongly-audible sound or noise, (2) The factor n by which a constant-intensity sound or noise exceeds, in the judgment of a listener, the loudness of a 1,000 Hz tone heard at a sound pressure 40 dB above threshold. The unit is the tone. See also loudness level.

LOUDNESS LEVEL - The number, attributed to a constant-intensity sound or noise, of decibels by which a 1,000 Hz purtone, judged by listeners to be as loud as the sound or noise, exceeds the reference level 2 x 10-5 N/m^2. The unit is the phon. See also loudness.

MASKING - The action of bringing one sound (audible when heard alone) to inaudibility or to unintelligibility by the introduction of another, usually louder, sound. See masking noise.

MASKING NOISE - A noise which is intense enough to render inaudible or unintelligible another sound which is simultaneously present.

NEAR FIELD - See far field.

NOISE - Any sound which is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying.

NOISE AND NUMBER INDEX (NNI) - A measure based on perceived noise level and used for rating the noise environment near an airport.

NOISE EXPOSURE - The cumulative acoustic stimulation reaching the ear of the person over a specified period of time (e.b., a work shift, a day, a working life, or a lifetime).

NOISE EXPOSURE FORECAST (NEF) - A measure of the total noise exposure near an airport; it is derived from EPNL contours for individual aircraft by including considerations of mix of aircraft, number and time of operation, runway utilization, flight path, and operating procedures.

NOISE-INDUCED PERMANENT THRESHOLD SHIFT (NIPTS) - Permanent threshold shift caused by noise exposure, corrected for the effect of aging (presbyacusis).

NOISE-INDUCED TEMPORARY THRESHOLD SHIFT (NITTS) - Temporary threshold shift caused by noise exposure.

NON-VOLUNTARY EXPOSURE TO ENVIRONMENTAL NOISE - The exposure of an individual to sound which (1) the individual cannot avoid or (2) the sound serves no useful purpose (e.g., the exposure to traffic noise or exposure to noise from a lawn mower).

NOYS - A unit used in the calculation of perceived noise level.

OCTAVE - Any two pure tones, whose ratio of frequencies is exactly two, are said to be "an octave apart", or to be "separated by an octave".

OCTAVE BAND - All of the components, in a sound spectrum, whose frequencies are between two sine wave components separated by an octave.

OCTAVE-BAND SOUND PRESSURE LEVEL - The integrated sound pressure level of only those sine-wave components in a specified octave band, for a noise or sound having a wide spectrum.

ONE THIRD-OCTAVE BAND - A frequency band whose cut-off frequencies have a ratio of 2-1/3, which is approximately 1.26. The cut-off frequencies of 891 Hz and 1,123 Hz define a third-octave band in common use. See also band center frequency.

ONSET - The character of the way in which a given sound begins (i.e., sudden vs. gradual).

PEAK SOUND PRESSURE - The maximum instantaneous sound pressure (a) for a transient or impulsive sound of short duration in time, or (b) in a specified time interval for a sound of long duration.

PERIODICITY - Number of occurrences of a noise during a given period of time.

PHON - The unit of measurement for loudness level.

PITCH - A listener's perception of the frequency of a pure tone; the higher the frequency, the higher the pitch.

PERCEIVED NOISE LEVEL (PNL) - The level in dB assigned to a noise by means of a calculation procedure that is based on an approximation to subjective evaluations of "noisiness".

PURE TONE - A sound wave whose waveform is that of a sine wave.

RANDOM NOISE - An oscillation whose instantaneous magnitude is not specified for any given instant of time. It can be described in a statistical sense by probability distribution functions giving the fraction of the total time that the magnitude of the noise lies within a specified range.

REVERBERATION - The persistence of sound in an enclosed space, as a result of multiple reflections, after the sound has stopped.

SOUND - See acoustics (1).

SOUND INSULATION - (1) The use of structures and materials designed to reduce the transmission of sound from one room or area to another or from the exterior to the interior of a building. (2) the degree by which sound transmission is reduced by means of sound insulating structures and materials.

SOUND LEVEL - The quantity in decibels measured by a sound level meter satisfying the requirements of American National Standards Specification for Sound Level Meters S1.4-1971. Sound level is the frequency-weighted sound pressure level obtained with the standardized dynamic characteristic "fast" or "slow" and weighting A, B, or C; unless indicated otherwise, the A-weighting is understood. The unit of any sound level is the decibel, having the unit symbol dB.

SOUND-LEVEL METER - An instrument, comprising a microphone, an amplifier, an output meter, and frequency-weighting networks, that is used for the measurement of noise and sound levels in a specified manner.

SOUND POWER - Of a source of sound, the total amount of acoustical energy radiated into the atmospheric air per unit time.

SOUND POWER LEVER - The level of sound power, averaged over a period of time, the reference being 10-12 watts.

SOUND PRESSURE - (1) The minute fluctuations in atmospheric pressure which accompany the passage of a sound wave; the pressure fluctuations on the tympanic membrane are transmitted to the inner ear and give rise to the sensation of audible sound. (2) For a steady sound, the value of the sound pressure averaged over a period of time. (3) Sound pressure is usually measured (a) in dynes per square centimeter (dyn/cm^2), or (b) in newtons per square meter (N/m^2). $1\ N/m^2 = 10\ dyn/cm^2$ 10^{-5} times the atmospheric pressure.

SOUND PRESSURE LEVEL - The level of sound pressure; squared and averaged over a period of time, the reference being the square of 2×10^{-5} newtons per square meter.

SOUND TRANSMISSION CLASS, (STC) - The preferred single figure rating system designed to give an estimate of the sound insulation properties of a partition or a rank ordering of a series of partitions. It is intended for use primarily when speech and office noise constitute the principal noise problem.

SPEECH-INTERFERENCE LEVEL (SIL) - A calculated quantity providing a handy guide to the interfering effect of a noise on speech. The speech-interference level is the arithmetic average of the octave-band sound-pressure levels of the noise in the most important part of the speech frequency range. The levels in the three octave-frequency determine the speech-interference level.

SPEED (VELOCITY) OF SOUND IN AIR - The speed of sound in air is 344m/sec or 1,128 ft/sec at 70 F.

SPHERICAL WAVE - A sound wave in which the surfaces of constant phase are concentric spheres. A small (point) source radiating into an open space produces a free sound field of spherical waves.

STEADY-STATE SOUNDS - Sounds whose average characteristics remain constant in time. Examples of steady-state sounds are a stationary siren, an air-conditioning unit, and an aircraft running up on the ground.

STRUCTURE BORNE SOUND - Sound that reaches the point of interest, over at least part of its path, by vibration of a solid structure.

THRESHOLD OF AUDIBILITY (THRESHOLD OF DETECTABILITY) - For a specified signal, the minimum sound pressure level of the signal that is capable of evoking an auditory sensation in a specified fraction of the trials.

THRESHOLD SHIFT - An increase in a hearing threshold level that results from exposure to noise.

TONAL QUALITY - See pitch or frequency.

TRANSIENT SOUNDS - Sounds whose average properties do not remain constant in time. Examples are an aircraft flyover, a passing truck, a sonic boom.

ULTRASONIC - Having a frequency above the audible range for man (conventionally deemed to cut off at 20,000 Hz).

WAVELENGTH - For a periodic wave (such as sound in air), the perpendicular distance between analogous points on any two successive waves. The wavelength of sound in air or in water is inversely proportional to the frequency of the sound. Thus the lower the frequency, the longer the wave length.

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